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SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 5 IN SET 235

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Emerson chassis 120182-D, 120195-D, 120196-B and 120197-B, -D were covered in Photofact Folder 5 — Set 235. Later production changes and the addition of chassis 120206-D, 120208-D, 120211-D and 120211-F were added with Production Change Bulletin 103 — Set 249-1.

Several new models and chassis have since been added. A list of all the models, with the chassis used in each is given below:

MODEL	CHASSIS	MODEL	CHASSIS
741F	120182-D	1007G	120211-F
757D	120182-D	1008C	120206-D
758F	120182-D	1008F	120225-D
759C	120195-D	1009E	120208-D
760M	120182-D	1009G	120211-F
781A	120196-B	1010C	120206-D
781B	120196-B	1011C	120208-D
781E	120206-D	1011G	120211-F
784E	120197-B	1012D	120182-D
784G	120197-D	1012F	120223-D
784K	120197-B	1013C	120195-D
784M	120211-D	1014D	120182-D
785K	120195-D	1015C	120195-D
792D	120206-D	1018C	120206-D
793E	120211-F	1018D	120206-D
1000C	120206-D	1022C	120206-D
1001E	120208-D	1022D	120206-D
1001G	120211-E	1023E	120211-D
1002C	120206-D	1024C	120206-D
1002D	120206-D	1025E	120211-D
1002F	120225-D	1026C	120206-D
1003E	120208-D	1027E	120211-D
1003F	120208-D	1028C	120206-D
1003G	120211-F	1029E	120211-D
1004C	120206-D	1036F	120225-D
1004F	120225-D	1040D	120225-D
1005E	120208-D	1040F	120225-D
1005F	120208-D	1041E	120211-D
1005G	120211-F	1042D	120225-D
1006C	120206-D	1044F	120225-F
1006F	120225-D	1074F	120225-F
1007E	120208-D		

EMERSON CHASSIS 120182-D, 120195-D, 120196-B, 120197-B, -D 120206-D, 120208-D, 120211-D, -F, 120223-D, 120225-D, -F

PRODUCTION CHANGES
BULLETIN 117

PRODUCTION CHANGES
BULLETIN 117

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Ch.120223-D, 120225-D, 120225-F	Chassis 120182-D, 120195-D, 120196-B, 120197-B, -D, 120206-D, 120208-D and 120211-D, -F are described in Production Change Bulletin 103 — Set 249-1. Chassis 120223-D is electrically identical to chassis 120182-D and chassis 120225-D, -F are electrically identical to chassis 120206-D; however, physically these chassis differ in type and placement of the high voltage compartment. V15, V16 and V17, with their associated components were moved, to the spot formerly occupied by V12 and V13, and V12 and V13 were moved to the spot formerly occupied by the high voltage cage. Chassis 120223-D uses a 17LP4 picture tube. Chassis 120225-D uses a 21YP4 picture tube. Chassis 120225-F uses a 21YP4 or 21YP4A picture tube and has slight differences in the mounting brackets from chassis 120225-D.
	In later production the following changes were made: ALTERNATE HORIZONTAL OUTPUT TRANSFORMER Original production used horizontal output transformer #738079. This was later changed to part no. 738084 (See Production Change Bulletin 103). In later production two new alternate transformers were added (part nos. 738094 and 738095). These transformers are directly interchangeable with nos. 738084 and 738079, except the 100MMF, 4000V capacitor (C76) is omitted. The distributed capacity of the new transformers make up for this capacitor. Due to component tolerances, it is sometimes necessary to install a .0022MFD, 400V capacitor across the width coil (T5) with these new transformers, in order to obtain sufficient width at low line voltage. TO CENTER THE RANGE OF THE VERTICAL HOLD CONTROL R65, in series with the vertical hold control, which was increased from 820KΩ to 1Meg in Production Change Bulletin 103 was decreased to 820KΩ again. This change was necessitated by component tolerances and the 1Meg resistor may again be used in later production. Chassis incorporating these changes are coded as follows: Ch. 120182-D △L — Ch. 120211-F △E Ch. 120206-D △I — Ch. 120223-D Initial Production Ch. 120208-D △E — Ch. 120225-D Initial Production Ch. 120211-D △L — Ch. 120225-F Initial Production
	TO ELIMINATE OVERLOAD OF VIDEO AMPLIFIER The suppressor grid (pin 7) of V7 was connected to the screen (pin 6) instead of to the cathode (pin 2). NOTE: When this change was made the 68Ω resistor to the contrast control was connected to pin 2 instead of to pin 7. Chassis incorporating this change are coded as follows. Ch. 120182-D △K — Ch. 120211-F △D Ch. 120195-D △K — Ch. 120223-D Initial Production Ch. 120206-D △H — Ch. 12022D-D Initial Production Ch. 120208-D △D — Ch. 120225-F Initial Production
	TO IMPROVE FRINGE ARE RECEPTION The 68Ω resistor, added in Production Change Bulletin 103, in series with the contrast control (R1A), to the cathode (pin 2) of V7 was omitted. It was found that this resistor was not needed when the suppressor grid was tied to the screen grid as outlined in the preceding change. Chassis incorporating this change are coded as follows. Ch. 120225-D △A Ch. 120225-F Initial Production
	COMPONENT CHANGE C1 was changed from part number 925243 to part number 925280 in chassis 120225-F, coded triangle A. This capacitor has one less section (C1B, 40MFD) so R54 and C1B are omitted. The audio output transfommer (T6) and C51 are connected directly to the 245V source. The screen (pin 4) of the audio output tube (V11) and AF amplifier (V10A) plate resistor (R51) are connected directly to the 210V source.

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 11 IN SET 204

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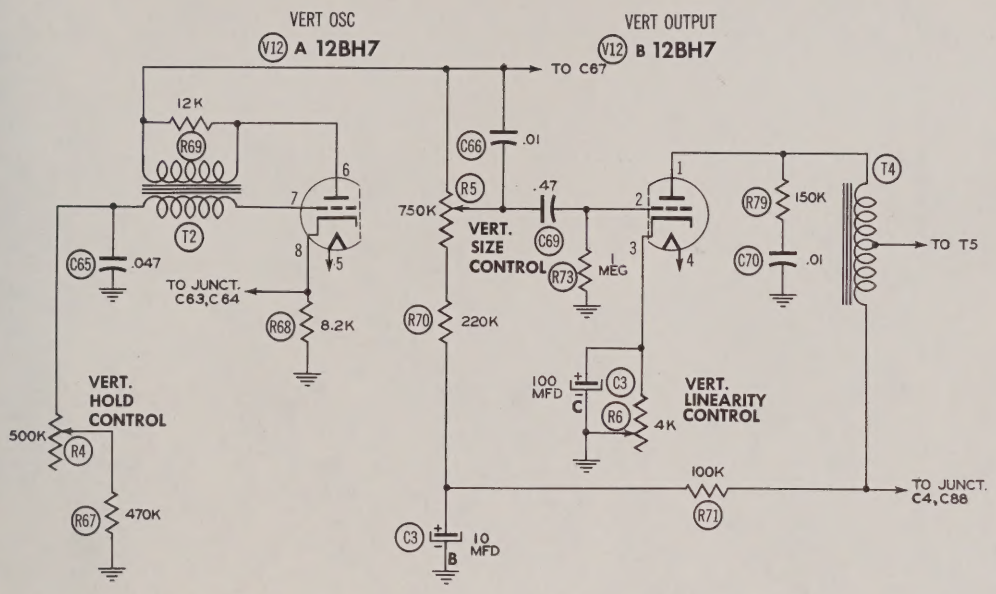
Truetone Models 2D1315B, 2D1325B, 2D2312B, 2D2314B, 2D2321B and 2D2322B are identical to the models covered in Photofact Folder 11 - Set 204, except for the following:

VERTICAL CIRCUITS REVISED

The vertical oscillator and output tube (V12) was changed from a type 12SN7GT to a type 12BH7. A partial schematic, showing the revised circuit, is given below.



VHF OSCILLATOR CIRCUIT REVISED

R19 was decreased from 2.2KΩ to 100Ω.

R18 was returned to the cathode (pin 3) and L15 was removed and replaced by a 2.2KΩ resistor.

COMPONENT CHANGES

C76 was increased from 5000MMF to .01MFD.

R90 was increased from 2.2Ω to 3.9Ω.

TRUETONE MODELS 2D1315B, 2D1325B, 2D2312B, 2D2314B, 2D2321B, 2D2322B

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 13 IN SET 198

Silvertone Models 3105 and 3145 (Ch. 132.024-5, -6) are covered in Photofact Folder 13 — Set 198. Later production of these models used chassis 132.024-7, -8. A list of the changes made in these chassis is given below.

Ch.132.024-7

Ch. 132.024-7 is identical to chassis 132.024-6, except for the following:

TO IMPROVE VERTICAL NOISE IMMUNITY

A 6C4, noise limiter stage, was added to the chassis. This tube is physically located in front of the damper tube (V19). A partial schematic, showing the new circuit, is given on the reverse side

In addition to the changes shown, R70, V13 (sync amp.) grid load resistor was changed from 2.2Meg to 4.7Meg.

Ch.132.024-8

Chassis 132.024-8 is identical to chassis 132.024-7 except for the following:

NEW PICTURE TUBE

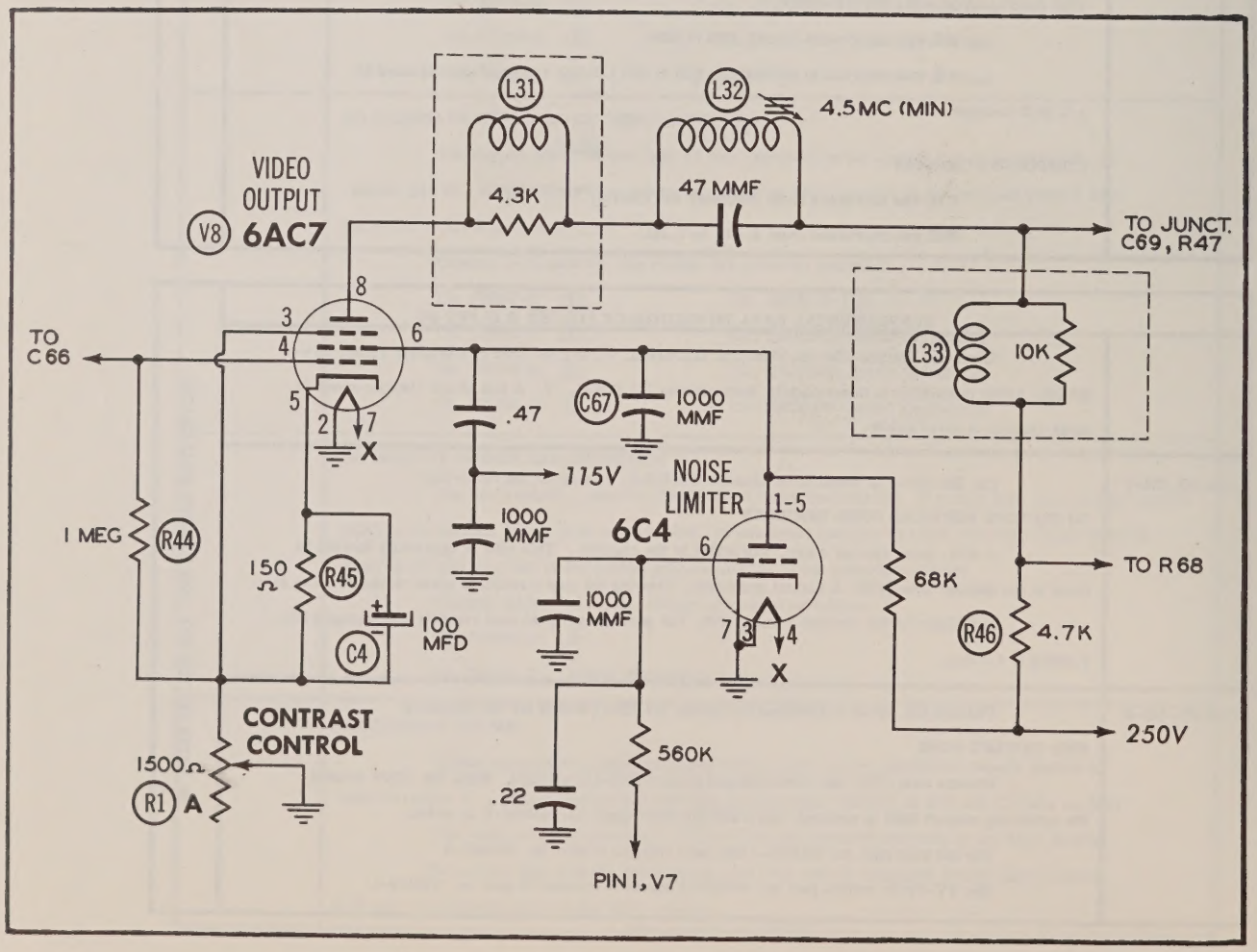
Picture tube (V22) has been changed from a 17LP4 to a 17QP4. When the 17QP4 is used the centering magnet (M6) is omitted, and a PM focalizer (part no. N40991-1) is added.

The Ion trap part no. N25662-1 has been changed to part no. N25662-3.

The TV-Phono switch part no. N40556-1 has been changed to part no. N41399-1.

SILVERTONE MODELS 3105, 3145 (Ch. 132.024-7, -8)

(Con't on reverse side)


L31
L32
4.5 MC (MIN)
VIDEO
OUTPUT
V8 6AC7
4.3K
47 MMF
TO JUNCT.
C69, R47
L33
10K
TO
C66
.47
C67
1000
MMF
115V
NOISE
LIMITER
1-5
6C4
1000
MMF
1 MEG
R44
150
Ω
R45
100
MFD
C4
1000
MMF
68K
TO R68
R46
4.7K
250V
CONTRAST
CONTROL
1500Ω
R1 A
.22
560K
PIN 1, V7

PHOTOFACT* Folder

AIRLINE MODELS GSE-5001A, GSE-5004A, GSE-5101A, GSE-5104A

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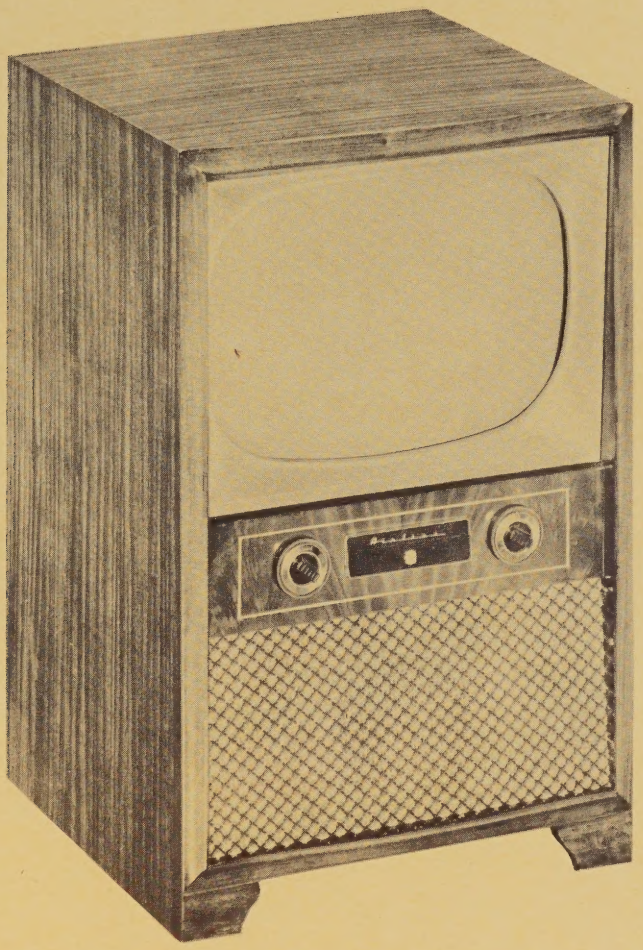

MODEL GSE-5001A

AIRLINE MODELS GSE-5001A, GSE-5004A, GSE-5101A, GSE-5104A

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DATE 3–55 SET 269 FOLDER 2

PHOTOFACT* Folder
*TRADE MARK

AIRLINE MODELS GSE-5001A, GSE-5004A, GSE-5101A, GSE-5104A

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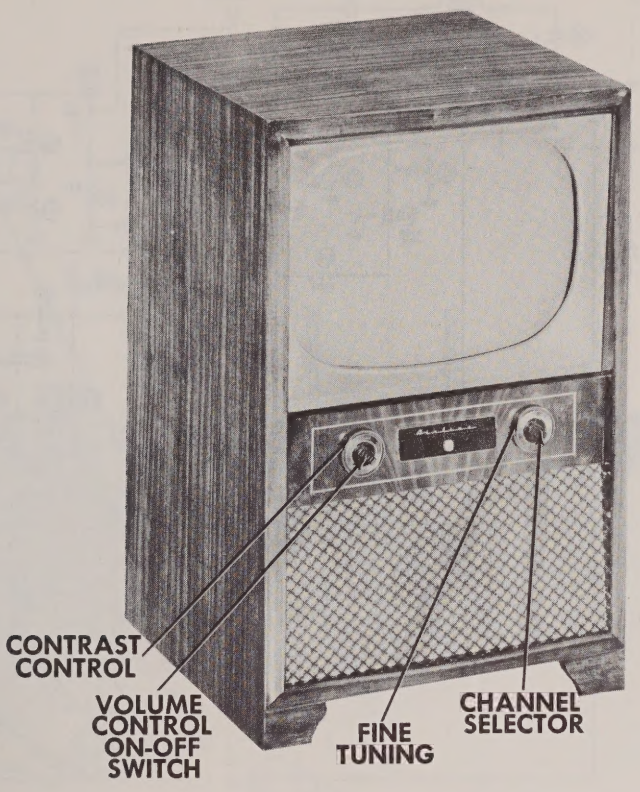

AIRLINE MODEL GSE-5001

TRADE NAME	Airline Models GSE-5001A, GSE-5004A (VHF only), GSE-5101A, GSE-5104A (UHF-VHF)
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Eighteen
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.52 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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AIRLINE MODELS GSE-5001A, GSE-5004A, GSE-5101A, GSE-5104A

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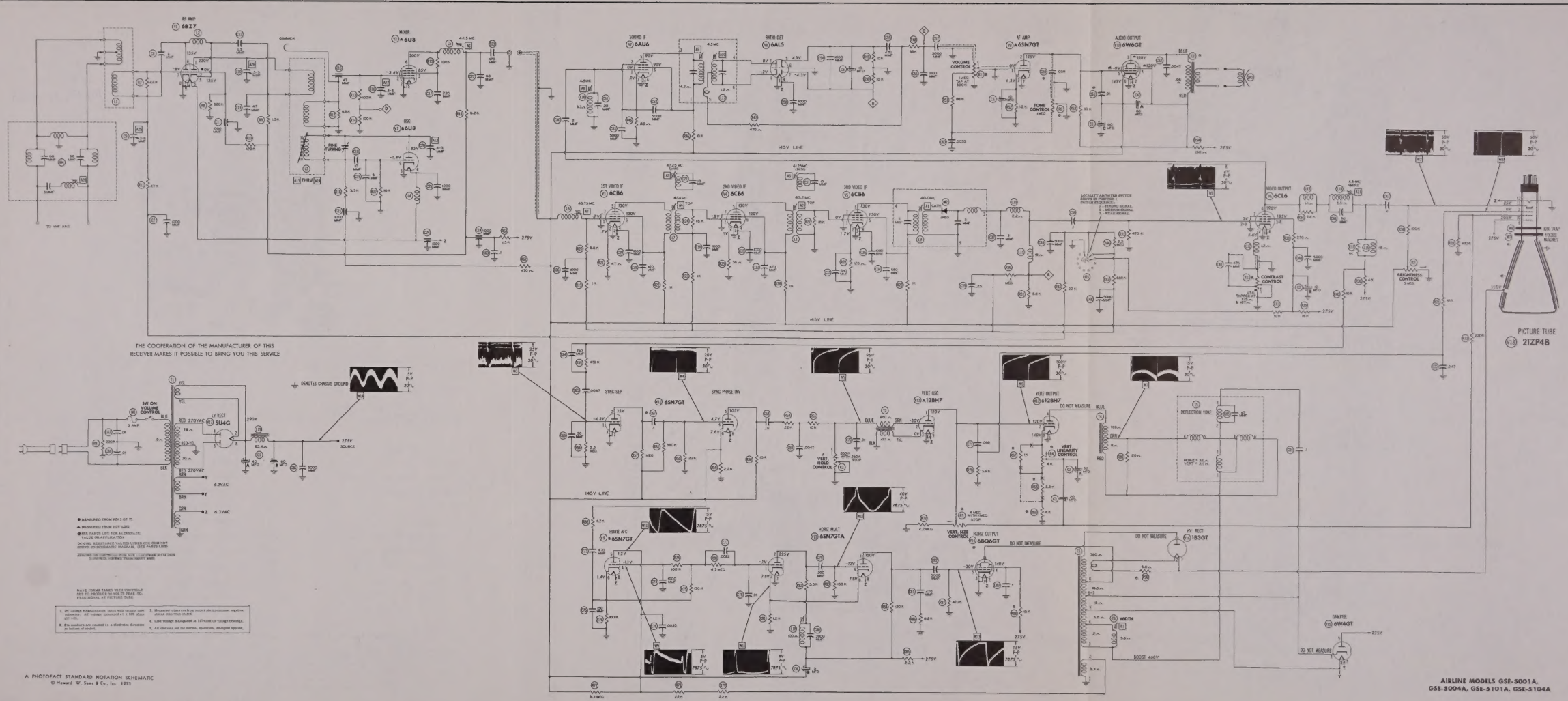
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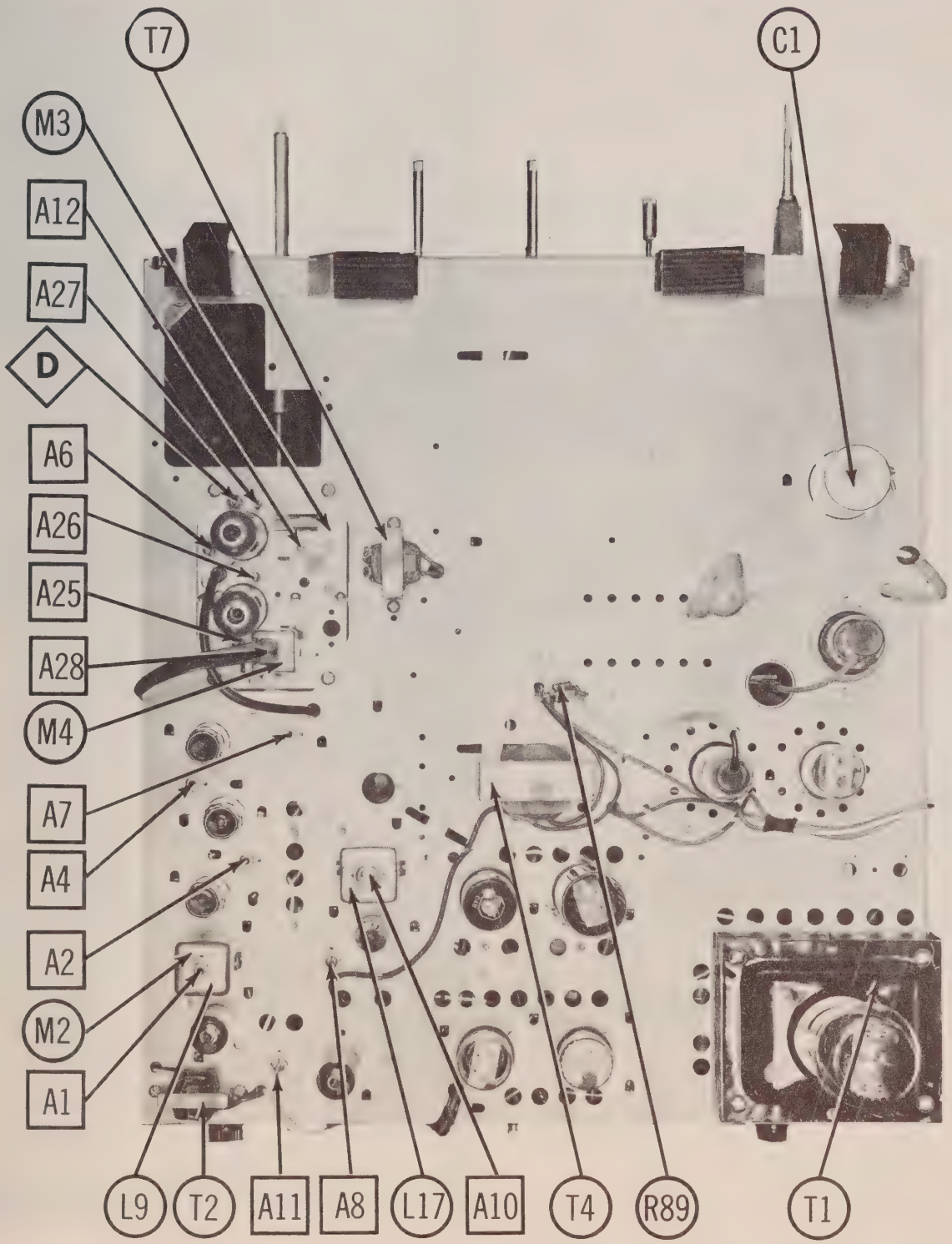
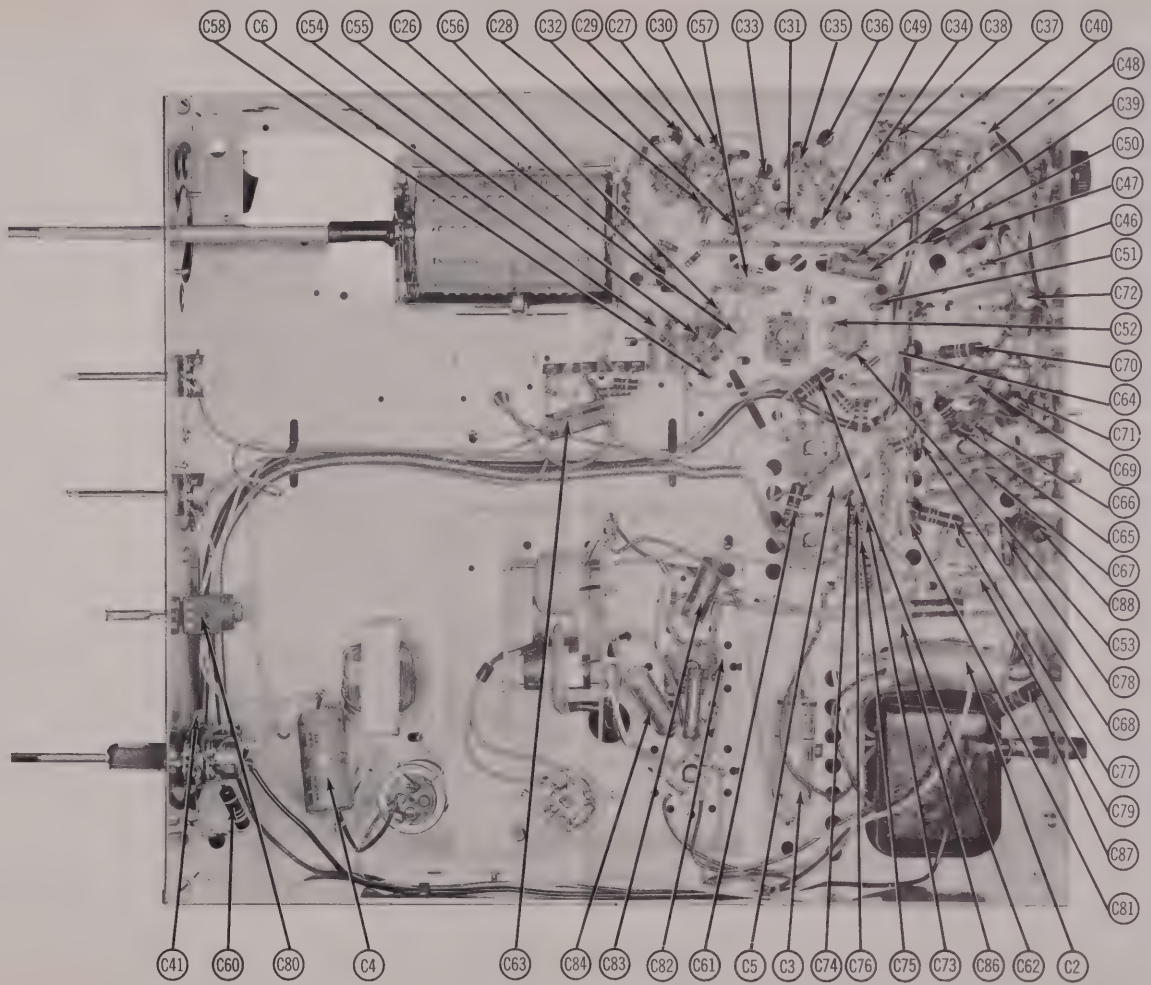


CHASSIS TOP VIEW

SET 269 FOLDER 2



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

DENVER, COLORADO

AIRLINE MODELS GSE-5001A, GSE-5004A, GSE-5101A, GSE-5104A

TUBE PLACEMENT CHART

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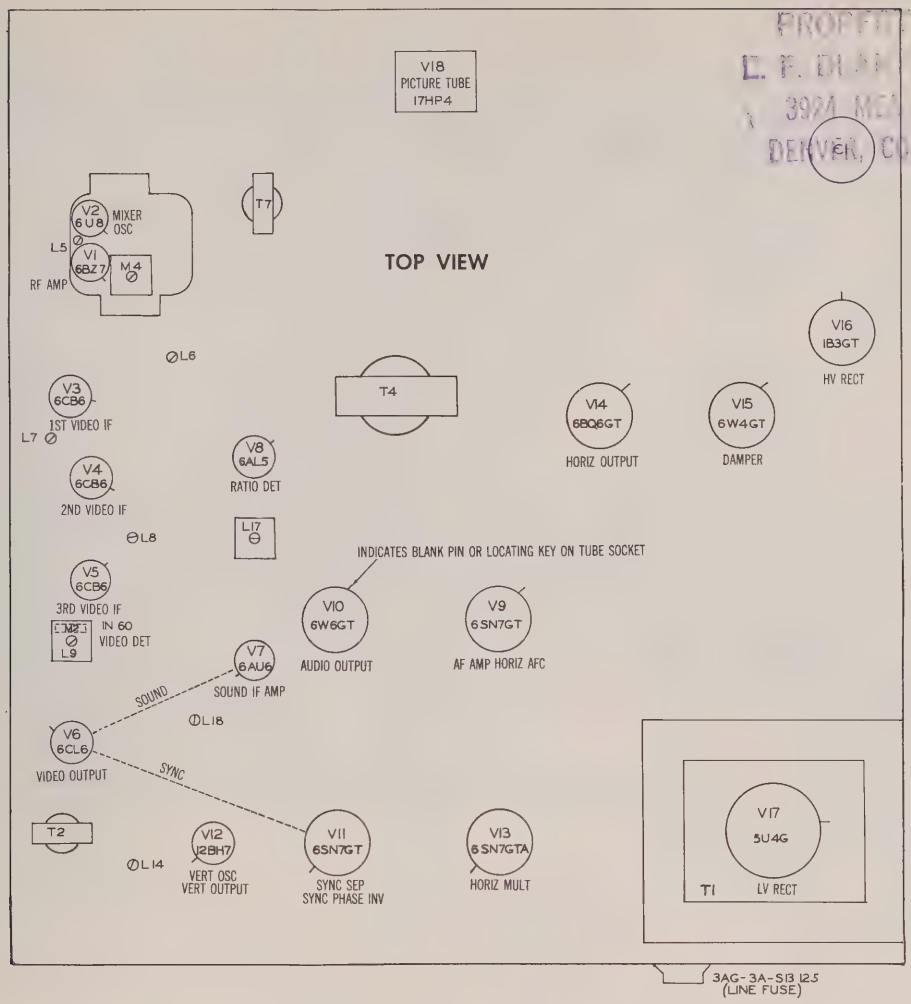

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V17, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6, V10
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V18
Has pic, no sound - V7, V8, V9, V10

SYNC FAILURE
No vert. sync - V11, V12
No horiz. sync - V9, V11, V13
No vert. or horiz. sync - V11

SWEEP FAILURE
No raster, has sound - V13, V14, V15, V16, V18
No vertical deflection - V12
Poor vert. linearity or foldover - V12
Poor horiz. linearity or foldover - V13, V14, V15
Narrow picture - V13, V14, V15, V16, V17
Vert. off freq. - V11, V12
Horiz. off freq. - V9, V11, V13

TY OF
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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal multivibrator tube (V13) to disable the high voltage.
Allow a 15 minute warm-up period for receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias battery to the ungrounded side of C39. Connect the positive lead to chassis.
Use only enough generator output to provide usable indication on VTVM.
Set "Locality Switch" (rear panel) to "Strong" position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield (loating over converter tube (V2). Low side to chassis.	44.0MC (Unmod)	3	DC probe thru 47KΩ to point (A) . Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	43.2MC	"	" "	A2	"
3.	"	"	41.25MC	"	"	A3	Adjust for MINIMUM deflection. Repeat steps 1 and 2.
4.	"	"	45.4MC	"	"	A4	Adjust for maximum deflection.
5.	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection. Repeat steps 4 and 5.
6.	"	"	44.5MC	"	"	A6	Detune A7 by adjusting fully counter clockwise.
7.	"	"	45.75MC	"	"	A7	Adjust for maximum deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8	Direct	High side to an ungrounded tube shield floating over converter tube (V2). Low side to chassis.	44MC (10MC Swp)	41.25MC 42.25MC 45.75MC 47.25MC	3	Vert. amp thru 47KΩ to point (A) . Low side to chassis.		Check for response curve similar to Fig. 1. If necessary, slightly retouch A1, A3, A4, A6 and A7 to obtain desired response. To view 41.25MC and 47.25MC markers, temporarily re-move bias battery and increase scope gain and marker generator output. Markers should fall in trap notch as in Fig. 1.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Set contrast control fully clockwise.
Attenuate generator output for approximately 5 volts at VTVM.
Remove the third video IF amplifier (V5) from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001MFD	High side to junction of L10 and L11. Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru 47KΩ to point (B) . Common to chassis.	A8, A9	Adjust for maximum deflection.
10.	"	"	"	"	DC probe thru 47KΩ to point (A) . Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V5 in its socket for final adjustment of A10 is best made with a TV station tuned in. Adjust A10 for MINIMUM buzz in the sound.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 80% modulation and 450KC sweep. Use 120v sawtooth voltage in scope for horizontal deflection.
Set contrast control fully clockwise.
Remove V5 from its socket.
Use only enough sweep generator output to provide usable indication on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9	.001MFD	High side to junction of L10 and L11. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. amp thru 47KΩ to point (B) . Low side to chassis.	A8, A9	Disconnect stabilizer capacitor C6. Adjust for curve of maximum amplitude and symmetry similar to Fig. 2.
10	"	"	"	"	"	Vert. Amp thru 47KΩ to point (A) . Low side to chassis.	A10	Reconnect stabilizing capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. Slightly retouch A9 for maximum amplitude and straightness of crossover lines. Replace V5 in its socket.

4.5MC TRAP ALIGNMENT

Remove V5 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.001MFD	High side to pin 11 (cathode) of picture tube . Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru 47KΩ to point (B) . Common to chassis.	All	Adjust for MINIMUM deflection. Replace V5 in its socket.

ALTERNATE 4.5MC ALIGNMENT

Restore the set to normal operating condition and tune in strongest TV station available. Adjust All for minimum 4.5MC best interference in picture.

OSCILLATOR ALIGNMENT

Leave bias connected as under "Video IF Alignment".
Restore tube shield on converter tube (V2) to its normal position.
Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A12. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel.
If adjustment of A12 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment for each channel that is off frequency.
The channel oscillator adjustment screws are reached through a hole above and just to the left of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

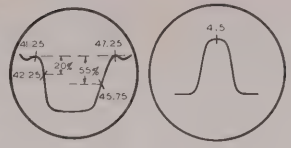


FIG. 1

FIG. 2

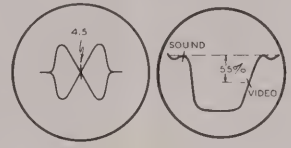


FIG. 3

FIG. 4

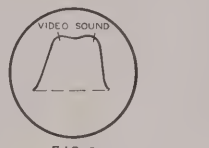


FIG. 5

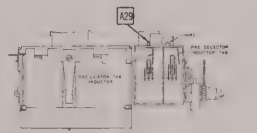


FIG. 6

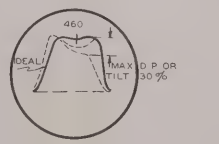


FIG. 7

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12	Two 120Ω carbon resistors.	Across antenna terminal with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp. thru 47KΩ to point (B) . Low side to chassis.	A13	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should fall at 55%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A14	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A15	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A16	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A17	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A18	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A19	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A20	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A21	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A22	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A23	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A24	

RF AND MIXER ALIGNMENT

Set the locality switch to "Strong" position. Leave the bias battery connected as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13	Two 120Ω carbon resistors.	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. amp thru 10KΩ to point (B) . Low side to chassis.	A25, A26 A27	Adjust for response curve similar to Fig. 5, with markers above 90%.
14	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13			Check for response similar to Fig. 5. If markers fall below 70% on any channel, make compromise adjustments of A25, A26 and A27 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

40MC TRAP ALIGNMENT

The 40MC trap (A28) will require adjustment only where a local interfering signal from 40MC thru 45MC affects the picture. In such cases A28 should be adjusted for minimum 40MC best interference in the picture.

UHF TUNER ALIGNMENT

The UHF tuner has been properly aligned at the factory and is very stable. Alignment should not be attempted unless absolutely necessary. Use extreme care to see that parts location and lead dress are not altered in the UHF tuner.
Switch VHF tuner to "UHF" position.
Loosely couple a UHF marker generator to the UHF sweep generator output lead.
Set the Locality Adjuster switch to "Weak" position.

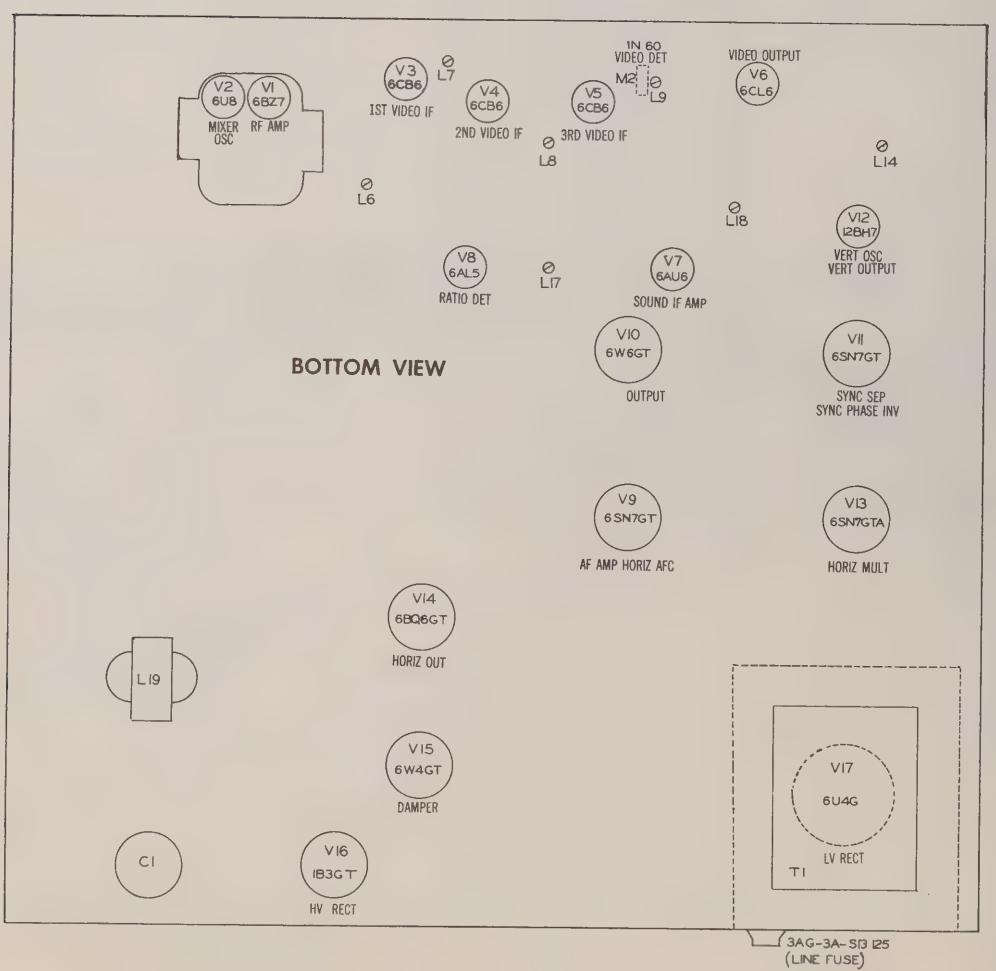
	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15	Two 120Ω carbon resistors.	Across UHF antenna terminals with 120Ω in each lead.	480MC (use maximum sweep width)	480MC	UHF tuner fully counter clockwise	Vert. amp. thru 10KΩ to point (B) . Low side to chassis.	A29	Carefully adjust A6 exactly 10 turns counter clockwise. Adjust A29 until 480MC marker is centered on response curve as in Fig. 7. If A29 has insufficient range and 480MC marker cannot be centered on response curve carefully bend the oscillator inductor tab (see Fig. 8) and resdjust A29 until marker is properly centered.
16	"	"	"	"	"	"		Carefully bend the pre-selector inductor tab (see Fig. 8) for maximum amplitude response similar to Fig. 7. Repeat steps 15 and 16. Carefully adjust A6 exactly 10 turns clockwise so that core is in its original position.

AIRLINE MODELS GSE-5001A, GSE-5004A, GSE-5101A, GSE-5104A

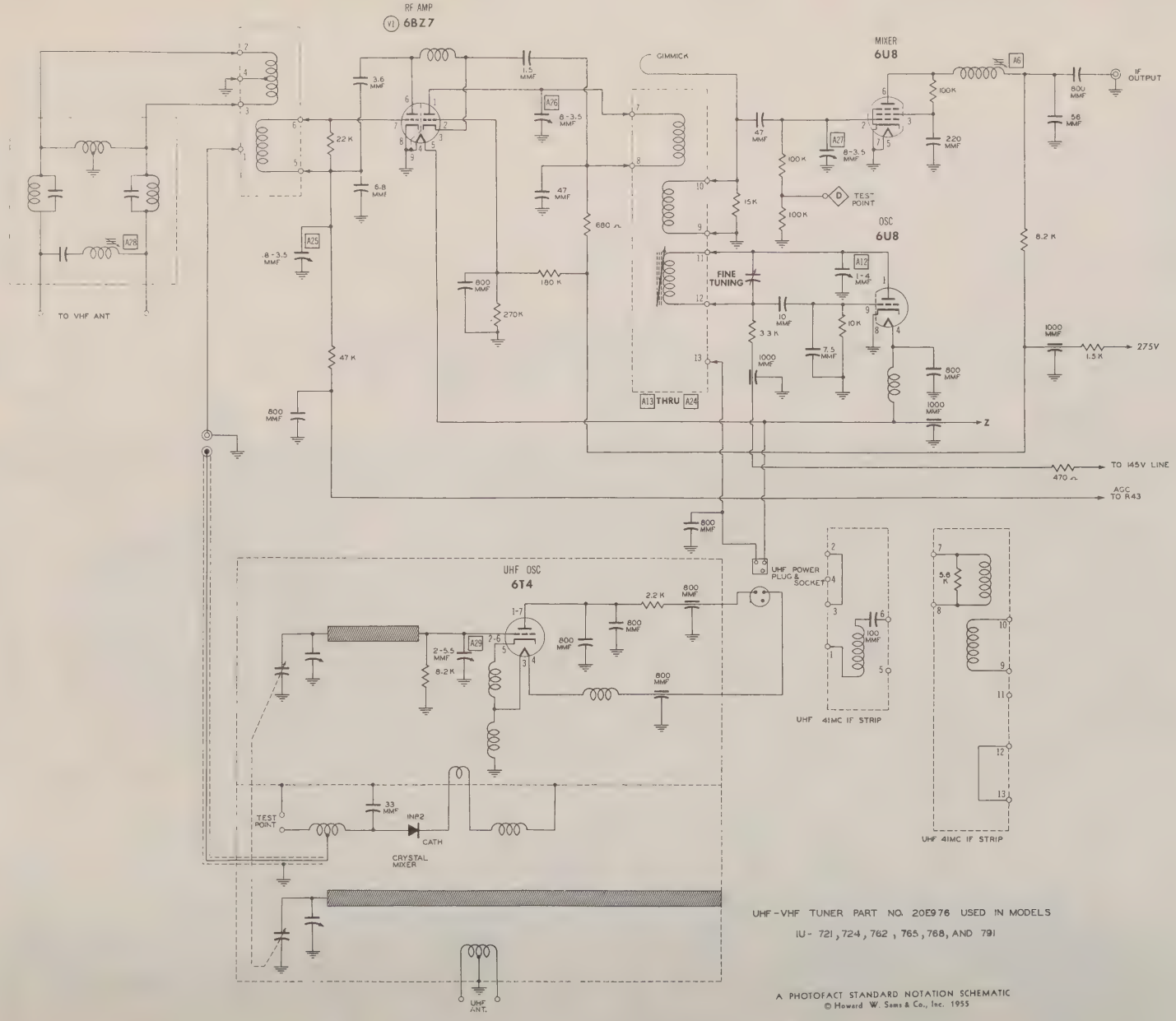
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†3KΩ	†320KΩ	INF	0Ω	.1Ω	INF	▲4Meg	0Ω	0Ω
V 2	6U8	■3.8KΩ	200KΩ	†100KΩ	.1Ω	0Ω	†9.7KΩ	0Ω	0Ω	10KΩ
V 3	6CB6	▲1.5Meg	47Ω	0Ω	.1Ω	■1KΩ	■1KΩ	0Ω		
V 4	6CB6	▲1.5Meg	56Ω	0Ω	.1Ω	■1KΩ	■1KΩ	0Ω		
V 5	6CB6	.1Ω	120Ω	0Ω	.1Ω	■1KΩ	■1KΩ	0Ω		
V 6	6CL6	230Ω	470KΩ	†18KΩ	.1Ω	0Ω	†4KΩ	0Ω	†18KΩ	470KΩ
V 7	6AU6	3.3Ω	150Ω	0Ω	.1Ω	■10KΩ	■10KΩ	150Ω		
V 8	6AL5	INF	INF	0Ω	.1Ω	10KΩ	0Ω	10KΩ		
V 9	6SN7GT	300KΩ	†33KΩ	1.2KΩ	350KΩ	45KΩ	100KΩ	0Ω	.1Ω	
V 10	6W6GT	INF	.1Ω	†400Ω	†215Ω	†33KΩ	INF	0Ω	120KΩ	
V 11	6SN7GT	2.2Meg	■1Meg	0Ω	22KΩ	■10KΩ	2.2KΩ	0Ω	.1Ω	
V 12	12BH7	▲1.7Meg	500KΩ	210Ω	0Ω	0Ω	▲1KΩ	▲1.7Meg	10KΩ	.1Ω
V 13	6SN7GT	5Meg	†7.8KΩ	1.2KΩ	150KΩ	†120KΩ	1.2KΩ	0Ω	.1Ω	
V 14	6BQ6GT	INF	.1Ω	45KΩ	†15KΩ	470KΩ	†120KΩ	0Ω	0Ω	Top Cap ▲16.8Ω
V 15	6W4GT	INF	INF	90KΩ	▲50Ω	†65Ω	INF	90KΩ	90KΩ	
V 16	1B3GT		PINS	1 THRU	8 HAVE	INFINITE	RESISTANCE			Top Cap ▲406Ω
V 17	5U4G	INF	130KΩ	INF	30Ω	INF	35Ω	INF	130KΩ	
V 18	17HP4	0Ω	14KΩ	Pin 6 †65Ω	Pin 10 ▲180KΩ	Pin 11 ■300KΩ	Pin 12 .1Ω			

† MEASURED FROM C1A.
▲ MEASURED WITH LOCALITY SWITCH IN "STRONG SIGNAL" POSITION.
■ MEASURED FROM 145V LINE.
▲ MEASURED FROM PIN 3 OF V15.



TUBE PLACEMENT CHART



UHF-VHF TUNER PART NO. 20E976 USED IN MODELS

IU-721, 724, 762, 765, 768, AND 791

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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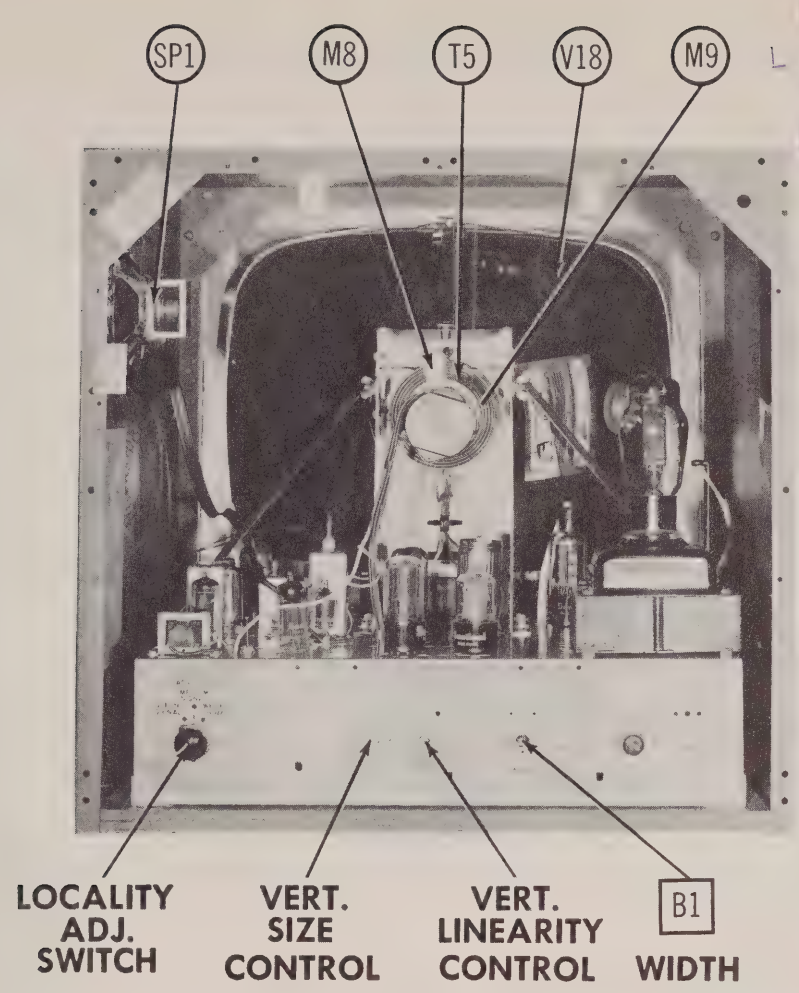
ALTERNATE TUNER SCHEMATIC

DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station preferably a test pattern.

Turn the horizontal hold control adjustment until the picture synchronizes horizontally.

Adjust the width coil slug (B1) for a picture slightly wider than necessary to fill the picture mask horizontally.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage."

INSUFFICIENT SWEEP

Check by substitution V14, V15 and V17. Check adjustment B1. Check R88, R86, C81, T3, T5A and other associated components.

DRIVE LINES

Check by substitution V14 and V15. Check T3, T5A, C81, C82, R88 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V14 and V15. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V13, V14 and V15. Check C78 for open. Check L18, C80, C79 and other associated components.

XMAS TREE EFFECT

Check by substitution V13, V14 and V15. Check T3 and T5A for internal arcing. Check L18, C80, C79, R82, R84, R81 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V12. Check T4, T5B, T2, C3, C2A, R5, R89 and other associated components.

INSUFFICIENT SWEEP

Substitute V12. Check vertical size and vertical linearity controls for proper operation. Check components associated with V12.

COMPRESSED AT BOTTOM

Substitute V12. Check R5, R72, T4, T5B and other associated components.

COMPRESSED AT TOP

Substitute V12. Check R4, R69, R68, R67 and other associated components.

FOLDS

Substitute V12. Check C71, R70, R69 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V11. Check R55, R57, R60, C64, C65, C67 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V12. Check C68, C69, C70, T2, R65, R64 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V9 and V13. Check horizontal AFC network. Check C78, C79, C80, L18 and other associated components.

HORIZONTAL BENDING

Check by substitution V11, V9 and V13. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V6. Check L13, L14, L15, R34, R37, R33, R35, C40 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A11. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check contrast control, picture tube, C47, L13, L15 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube, video crystal detector and C47. Check video IF alignment.

SMEAR

Substitute V6. Check L10, L11, L13, L15, R37, R34 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7, V8, V9 and V10. Check stages V9 and V10 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C57, C61, C62, R54, R53, T7, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A10. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check M1 fuse. Check switch on volume control and T1. If filaments light, substitute V17. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V17. Check B+ filter and decoupling network.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		AIRLINE PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Mixer-Osc.	6U8	6U8	9AE	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output	6CL6	6CL6	9BV	
V7	Sound IF Amp.	6AU6	6AU6	7BK	
V8	Ratio Detector	6AL5	6AL5	6BT	
V9	AF Amp.- Horiz. AFC	6SN7GT	6SN7GT	8BD	
V10	Audio Output	6W6GT	6W6GT	7S	
V11	Sync Sep.- Sync Phase Inverter	6SN7GT	6SN7GT	8BD	
V12	Vert. Osc.- Vert. Output	12BH7	12BH7	9A	
V13	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V14	Horiz. Output	6BQ6GT	6BQ6GT	6AM	6CU6 used in some sets
V15	Damper	6W4GT	6W4GT	4CG	
V16	HV Rectifier	1B3GT	1B3GT	3C	
V17	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	AIRLINE PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V18	21ZP4B	21ZP4B	21ZP4B	21ZP4B	21ZP4B	12N	① Circuit change necessary.
	21YP4A	21YP4A	21YP4A	21YP4A	21YP4A	12L	
		21YP4			21YP4	12L	
				21AFP4 ①		12M	
	21ZP4A	21ZP4A	21ZP4A	21ZP4A	21ZP4A	12N	
				21ZP4 ①		12D	
	17HP4/17RP4	17HP4/17RP4	17HP4/17RP4	17HP4/ 17RP4	17HP4/17RP4	12L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	350	25E78	E4C629		C118			TVL-3764	
B	■80	350				BR4035			TVA-1611	
C	▲100	200								
C2A	▲60	200		AFH2-60		B046		FP330.7	TVL-3670	Red
B	■10	350								
C3	20	450	25E64	PRS450/20		BR2045		TC75	TVA-1709	
C4A	60	250	25E62	PRS450/60		BR6025		TC68	TVA-2525	Red
B	5	250		PRS250/4		BR425		TC50X		
C5	10	50	25E66	PRS50/10		BR105		TC32	TVA-1304	
C6	10	50	25E66	PRS50/10		BR105		TC32	TVA-1304	
C7	1000		CD8X-102Z	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C8	3		13L8C030K	SI3NP0	TCZ-3.3	TZ06	NP0K-030	ZT-553	5TCCB-V33	
C9	3-9		31A-056-2							
C10	.5-3		31A-056-1		829-3		3115-01-0R5	CT565A		
C11	1000		13M28N1027-03	EF-001	MFT-1000				503C-D1	
C12	1.5		13L8C1R5C	SI1.5NP0	TCZ-1.5	TZ04	NP0K-1R5	ZT-5515	5TCCB-V15	
C13	47		13L8Q470K							
C14	1000		13M-28N1027-03	EF-001	MFT-1000				503C-D1	
C15	47		13M20U470K-R							
C16	.5-3		31A-056-1		829-3		3115-01-0R5	CT565A		
C17	220		13L12D221K	BPD-00022	D6-221	G051	GP1K-221	UC-5322	5GA-T22	
C18	10		13L8T100A	SI10N750	TCN-10	N018	N750K-100	NT-541	5TCU-Q1	
C19	5		13L8UA050C	SI5NP0	TCZ-4.7	Z010	NP0K-050	ZT-555	5TCCB-V47	
C20	.5-3		31A-056-1		829-3		3115-01-0R5	CT565A		
C21	1000		13M-28N1027-03	EF-001	MFT-1000				503C-D1	
C22	68		13L12U680H	SI68N750	TCN-68	TN18	N750K-680		5TCU-Q68	
C23	470		23E2027-14	BPD-00047	DD-471	K060	801-00047	UC-5347	5GA-T47	
C24	1000		13M-28N1027-03	EF-001	MFT-1000				503C-D1	
C25	1000		CD8X-102Z	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C26	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C27	15			SI15NP0	TCZ-15	TZ11	NP0K-150		5TCC-Q15	
C28	470		23E4000-26	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C29	1000		23E4000-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C30	1000		23E4000-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C31	15			SI15NP0	TCZ-15	TZ11	NP0K-150		5TCC-Q15	
C32	470		23E4000-26	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C33	1000		23E4000-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C34	680		23E4000-28	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C35	680		23E4000-28	SI680	D6-681	TP50	GP2K-681	UC-5368	5GA-T68	
C36	1000		23E4000-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C37	3		23E4001-6	SI3NP0	TCZ-3.3	TZ06	NP0K-030	ZT-553	5TCCB-V33	
C38	.1	200	23E3216	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C39	.25	100	23E122	P288-25		PJ2P25		PT4025	2TM-P25	
C40	5000		23E4004-15	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C41	470		23E4000-26	SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C46	30		23E4001-9	SI30NP0	TCZ-30	TZ17	NP0K-300	ZT-5433	5TCC-Q33	
C47	.1	400	23E3416	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C48	5000		23E4004-15	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C49	5000		23E4004-15	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C50	2		23E4001-7	SI2NP0	TCZ-2.2	TZ05	NP0K-020		5TCCB-V22	
C51	20		23E4001-8	SI20NP0	TCZ-20	TZ13	NP0K-200	ZT-542	5TCC-Q2	
C52	5000		23E4004-15	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C53	5000		23E4004-15	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C54	1000		23E4004-5	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C55	470		23E3500-40			5W5T47		MCE245	MS-35	

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DENVER, COLO.

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C56	1000		23E4000-30	SH1000	D6-102	TP52	GP2L-103	UC-531	5GA-KJ
C57	5000		23E4004-15	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5
C58	1000		23E4004-5	BPD-001	DD-102	K089	801-001	DC-531	5HK-D1
C59	.039		23E3423			CUB6839		PT6139	5TM-S39
C60	.0033	400	23E3407	P488-0033	D6-332	CUB6D33	GP2-333-332	PT6233	5TM-D33
C61	.01	400	23E3408	P488-01	D6-103	CUB6D41	GP2-333-103	PT641	5TM-S1
C62	.0047	600	23E3608	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	5TM-D47
C63	.1	400	23E3418	P488-1	DF-104	CUB4P1		PT401	4TM-P1
C64	150		23E4000-25						
C65	.0047	600	23E3608	P688-0047	D6-472	CUB6D47	GP2-333-472	PT6247	5TM-D47
C66	30		23E4001-9						
C67	.1	200		P388-1	DF-104	PT2P1		PT401	2TM-P1
C68	.01	400	23E3410	P488-01	D6-103	CUB4S1	GP2-333-103	PT641	4TM-S1
C69	.0047	400	23E3408	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	4TM-D47
C70	.01	400	23E3424						
C71	.068	400	23E3415	P488-068		CUB4S68		PT4168	4TM-S68
C72	.047	400	23E3414	P488-047	DF-503	CUB4647		PT4147	4TM-S47
C73	470	500	23E3500-40	1468-0009		SWS7247		MCE245	MS-35
C74	1000		23E4004-5	BPD-001	DD-102	K089	801-001	DC-531	5HK-D1
C75	150		23E4000-20	6H150	D6-151	TP56	GPK-151	UC-5315	5GA-T15
C76	.0033	400	23E3407	P488-0033	D6-332	CUB4D33	GP2-333-332	PT4233	4TM-D33
C77	.0022	400	23E3406	P488-0022	D6-222	CUB4D22	GP2-333-222	PT4223	4TM-D22
C78	.01	400	23E3410	P488-01	D6-103	CUB4S1	GP2-333-103	PT641	4TM-S1
C79	390	500	23E3500-39	1468-0004		SWS7239		MCE243	MS-34
C80	3900	500	23E4005-54	1467-004		IWE5D39		MCE463	MS-34
C81	470	500	23E3500-40	1468-0004		SWS7247		MCE245	MS-35
C82	5000		23E4004-15	BPD-005	DD-502	K080	801- 005	DC-525	5HK-D5
C83	.1	400	23E3418	P488-1	DF-104	CUB4P1		PT401	4TM-P1
C84	.1	600	23E3616	P688-1	DF-104	CUB6P1		PT601	6TM- P1
C85	47	3000	23E4015-5						
C86	5000		23E4004-15	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5
C87	.01	600	23E3910	689ZX-01	D6-103	P6S1	GP2-333-103	PT6U	6TM-S1
C88	.01	600	23E3610	689ZX-01	D6-103	P6S1	GP2-333-103	PT6U	6TM-S1

Note 1. Some versions may use an .047MFD @ 200V in this application.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	AIRLINE PART No.	IRC PART No.	CLAROSTAT	CENTRALAB PART No.	MALLORY PART No	INSTALLATION NOTES
R1A	15000		28E99-2	*QJ-903		F1-B		Contrast tapped at 375Ω & 1875Ω panel. Volume tapped at 300KΩ rear. Attach to R1B
B	1Meg					R2-E3		Brightness
C	Switch					KB-1		
R2	5Meg		28E109	Q17-141				Vertical hold - Note 1
R3A	850KΩ with 250K stop		28E111	Q11 137	A47-1Meg-S	AB-59	U-54	
B	Shaft		Not Req.	Not Req.	KSB-3	AK-4	Not Req.	Attach to R3A
R4A	4000Ω		28E108	Q11-14	A47-4000-S	AB-10	U-14	Vert. Linearity - Note 2
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	4 Meg with 1Meg stop.		28E110	Q11-161	A47-4Meg-S	AB-86	U-67	Vert. Size - Note 3
B	Shaft		Not Req.	Not Req.	KSB-3	AK-4	Not Req.	Attach to R5A
R6	1Meg		28E113					Tone - Note 4

Note 1: Connect a 270KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
Note 2: Some models may use an alternate control part no. 28E117.
Note 3: Connect a 1Meg resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
Note 4: Not used in some versions.
* CONCENTRIKIT EQUIVALENT: KIT K-5 BASE ELEMENTS & SHAFTS: B17-108XX & P6-302 (PANEL)
B13-137X & R9-324 (REAR)
76-1 SWITCH

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	AIRLINE PART No.	IRC PART No.	NOTES
R7	22KΩ	½	27E2233K-½	BTS-22K	
R8	820KΩ	½	27E8245-½	BTS-820K	
R9	1500Ω	1	27E1532K-1	BTA-1500	
R10	470KΩ	½	27E4744M-½	BTS-470K	
R11	47KΩ	½	27E4733K-½	BTS-47K	
R12	6800Ω	½	27E6823K-½	BTS-6800	
R13	100KΩ	½	27E1044K-½	BTS-100K	
R14	100KΩ	½	27E1044K-½	BTS-100K	
R15	100KΩ	½	27E1044K-½	BTS-100K	
R16	8200Ω	½	27E8223K-½	BTS-8200	
R17	10KΩ	½	27E1033K-½	BTS-10K	
R18	3300Ω	1	27E3323K-1	BTA-3300	
R19	1000Ω	½	27E1023K-½	BTS-1000	
R20	6800Ω	½	27E6823K-½	BTS-6800	
R21	470Ω	½	27E4703K-½	BTS-470	
R22	1000Ω	½	27E1023K-½	BTS-1000	
R23	1000Ω	½	27E1023K-½	BTS-1000	
R24	18KΩ	½	27E1833K-½	BTS-18K	
R25	56Ω	½	27E560K-½	BTS-56	
R26	1000Ω	½	27E1023K-½	BTS-1000	
R27	18KΩ	½	27E1833K-½	BTS-18K	
R28	120Ω	½	27E121K-½	BTS-120	
R29	1000Ω	½	27E1023K-½	BTS-1000	
R30	1.5Meg	½	27E1554M-½	BTS-1.5Meg	
R31	5600Ω 5%	½	27E5652J-½	BTS-5600 5%	
R32	470KΩ	½	27E4743M-½	BTS-470K	
R33	270Ω	½	27E271K-½	BTS-270	
R34	5600Ω 5%	½	27E5622J-½	BTS-5600 5%	
R35	18KΩ	½	27E183K-2	BTS-18K	
R36	4000Ω	½	27E1024K-14		

ITEM No.	RATING OHMS	RATING WATT	AIRLINE PART No.	IRC PART No.	NOTES
R37	1000Ω	½	27E1023K-½	BTS-1000	
R38	100KΩ	½	27E1044K-½	BTS-100K	
R39	470KΩ	½	27E4744M-½	BTS-470K	
R40	10KΩ	½	27E1033K-½	BTS-10K	
R41	10KΩ	½	27E1033K-½	BTA-10K	
R42	680KΩ	½	27E684M-½	BTS-680K	
R43	22KΩ	½	27E2233K-½	BTS-22K	
R44	2.2Meg	½	27E2254M-½	BTS-2.2Meg	
R45	100KΩ	½	27E1044K-½	BTS-100K	
R46	10KΩ	½	27E1033K-½	BTS-10K	
R47	470Ω	½	27E471K-½	BTS-470	
R48	33KΩ	½	27E3333K-½	BTS-33K	
R49	10KΩ 5%	½	27E1033J-½	BTS-10K 5%	
R50	10KΩ 5%	½	27E1033J-½	BTS-10K 5%	
R51	68KΩ	½	27E6833K-½	BTS-68K	
R52	1200Ω	½	27E122K-½	BTS-1200	
R53	33KΩ	½	27E3333K-½	BTA-33K	
R54	150Ω	½	27E151K-½	BTA-150	
R55	470KΩ	½	27E4744M-½	BTS-470K	
R56	2.2Meg	½	27E2254M-½	BTS-2.2Meg	
R57	1Meg	½	27E1054M-½	BTS-1Meg	
R58	22KΩ	½	27E2233K-½	BTS-22K 5%	
R59	2200Ω	½	27E222K-½	BTS-2200	
R60	10KΩ	½	27E1033K-½	BTS-10K	
R61	560KΩ	½	27E564K-½	BTS-560K	
R62	470Ω	½	27E471K-½	BTS-470	
R63	1900Ω	½	27E1524K-½	BTA-1900	
R64	22KΩ	½	27E2233K-½	BTS-22K	
R65	10KΩ	½	27E1033K-½	BTS-10K	
R66	4700Ω	½	27E472K-½	BTS-4700	
R67	1000Ω	½	27E1023K-½	BTS-1000	Note 1

RESISTORS (cont)

ITEM No	RATING OHMS	RATING WATT	AIRLINE PART No.	IRC PART No.	NOTES
R68	330Ω	2	27E337K-2	BTB-3300	Note 1
R69	6800Ω	4	27E1016-3		Note 2
R70	3000Ω	2	27E303K-1	BTB-3900	
R71	10KΩ	2	27E103K-1	BTS-10K	
R72	2.7Meg	1	27E2259M-½	BTS-2.2Meg	
R73	220Kω	1	27E224M-½	BTA-220K	
R74	1000KΩ	1	27E104K-½	BTS-100K	
R75	150KΩ	1	27E153K-½	BTS-150K	
R76	100KΩ	1	27E104K-½	BTS-100K	
R77	3.3Meg	1	27E335M-½	BTS-3.3Meg	
R78	22KΩ	1	27E223K-½	BTS-22K	
R79	22KΩ	½	27E223K-½	BTS-22K	

ITEM No	RATING OHMS	RATING WATT	AIRLINE PART No.	IRC PART No.	NOTES
R80	4.7Meg	½	27E475M-½	BTS-4.7Meg	
R81	1200Ω	½	27E122K-½	BTS-1200	
R82	5600Ω 5%	½	27E5652J-½	BTS-5600 5%	
R83	150KΩ	½	27E154K-½	BTS-150K	
R84	120KΩ	½	27E124K-½	BTS-120K	
R85	2200Ω	1	27E222K-½	BTA-2200	
R86	8200Ω 5%	½	27E8223J-½	BTS-8200 5%	
R87	470KΩ	½	27E474M-½	BTS-470K	
R88	15KΩ	½	27E1016-13	1.3/4A-15K	Note 3
R89	120Ω	½	27E121K-½	BTS-120	
R90	6.8Ω	1	27E015-5		
R91	220KΩ	½	27E224M-½	BTS-220K	

TRANSFORMER (POWER)

ITEM No.	RATING PRI	RATING SEC 1	RATING SEC 2	RATING SEC 3	RATING SEC 4	RATING SEC 5	AIRLINE PART No.	Stancor PART No.	Merit PART No	Triad PART No	RCA TYPE No	Halldorson PART No	Thordorson PART No
T1	117VAC @1.52A	550VCT @.220ADC	5VAC @ 3A	6.3VAC @ 1.5A	6.3VAC @ 1.5A		22E94	P-8333①					

① Drill new mounting holes.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	AIRLINE PART No.	Halldorson PART No.	Merit PART No	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordorson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	22E59	B6102	A-3003	209T1 ①	V405	A-8135	24A87 ⑦	A-97X
T3	Horiz. Output Trans.	20E947-D	FB4U *& FB4W *&	HV6-8 *& MVC-1 ③	232T1 *& 232T2 ②	X080 *& 20JR14 ⑤		FLY-24 *& FLY-24 ⑦	D-35 *& WC-12 ③
T4	Vert. Output Trans.	22E72-2	RF600 ③ 21805 ③	MVC-1 ③ A-3081 ③		V306 ③ 12	A-8140 ③ ⑤	26E57 ③	A-110X ①
T5A B	Yoke-Horiz. (34MM) Vert. (3.1MM)	20E788-4 20E788-5 ⑤ 20E787-3 ⑤	DF603 ③	MDF-14 ③	214DI ③	Y70F25/3 ③	DY-10A ③	Y-11 ③ ⑤	Y-20-1 ③ ⑤
T6	Width (.7-7MM)	20E852		MWC-4 ⑩	213RI ⑩	20IR15 ⑩	WC-8 ⑩	WC-22 ⑩	WC-12 ⑩

① Drill one new mounting hole.
② Mount on inside of high voltage shield.
③ Drill new mounting holes.
④ Use 50-1 turns ratio.
⑤ Alternate yoke used with electro-static focus picture tube.
⑥ Alternate yoke used with electro-magnetic focus picture tube.
⑦ Connect terminal #1 to terminal #5 or #8.
⑧ Use original yoke network.
⑨ Use original rear cover and positioning device.
⑩ Enlarge mounting hole.
⑪ Connect to coded blue and green terminals.
⑫ Connect as auto transformer.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordorson Replacement Connections	Triad Replacement Connections
	8	9	9	10	8		9	10
	7 & 6	7	7	8	5 or 4		7	8
	5	4	4	5	7		4	5
	4	3	3	2	3		3	2
	3	1		3	1		1	3
	2	#2 term. RF800 3 & 1	MWC-1 Brown term. #4 term.	212RI Blue term. across 2 & 4.	20IR14 Inner-winding across 3 & 1		WC-20 #2 term. 3 & 1	WC-12 Red & Blu. terms across 2 & 4
Correct Width Coil Across	3 & 4	RF800 #1 & #2 terms across 3 & 1	MWC-1 Blu. & Red terms across 2 & 4	212RI Blue term. across 2 & 4.	20IR14 Inner-winding across 3 & 1		WC-20 #3 & #4 terms across 3 & 1	WC-12 Red & Blu. terms across 2 & 4
Special Notes		⑬	⑬	⑬	⑬ ⑭		⑬	⑬

⑬ If picture is out of phase, reverse primary or secondary of replacement width coil.
⑭ Jumper terms #7 and #8.
⑮ Jumper terms #9 and "T".

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	IMPEDANCE SEC	AIRLINE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordorson PART No.	NOTES
T7	2.5KΩ	3.4Ω	22E91 22E92 ①	A-3332	A-3025	S-12X	Z1101	22345	① Used in models using two speakers.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C	RATINGS IMP	AIRLINE PART No.	VIKING PART No	QUAM PART No	NOTES
SP1	8"	PM	3. 4Ω		1E34-2	879	BA31	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI	DC RES. SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	01CT	0Ω	31M-012-2				Channel 2
B	Ant. Coil	01CT	0Ω	31M-012-3				Channel 3
C	Ant. Coil	01CT	0Ω	31M-012-4				Channel 4
D	Ant. Coil	01CT	0Ω	31M-012-5				Channel 5
E	Ant. Coil	01CT	0Ω	31M-012-6				Channel 6
F	Ant. Coil	01CT	0	31M-012-7				Channel 7
G	Ant. Coil	01CT	0Ω	31M-012-8				Channel 8
H	Ant. Coil	01CT	0Ω	31M-012-9				Channel 9
I	Ant. Coil	01CT	0Ω	31M-012-10				Channel 10
J	Ant. Coil	01CT	0Ω	31M-012-11				Channel 11
K	Ant. Coil	01CT	0Ω	31M-012-12				Channel 12
L	Ant. Coil	01CT	0Ω	31M-013-13				Channel 13
L2	Mext. Coil	0Ω		31M-628				
L3A	RF Mixer Grid & Osc. Coils	0Ω		31M-312-2				Channel 2
B	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-3				Channel 3
C	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-4				Channel 4
D	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-5				Channel 5
E	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-6				Channel 6
F	RF, Mixer Grid & Osc. Coils	0Ω		31M-312 "				Channel 7
G	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-8				Channel 8
H	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-9				Channel 9
I	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-10				Channel 10
J	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-11				Channel 11
K	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-12				Channel 12
L	RF, Mixer Grid & Osc. Coils	0Ω		31M-312-L2				Channel 13
L4	Pil. Choke	0Ω		54A-704				
L5	Conv. Plate	.1Ω		31K-109				
L6	1st Video IF	0Ω		20E857	17-4523*		6219*	
L7	3rd Video IF	.1Ω	.1Ω	20E898				Includes 47. 25MC trap.
L8	3rd Video IF	.1Ω	.1Ω	20E859				Includes 41. 25MC trap.
L9	4th Video IF	.1Ω		20E860				
L10	Series Peaking Coil	2.2Ω		20E885	19-1005		4812	12Microhenries
L11	Mext peaking coil	15Ω		20E363-18	19-1923		4848	390Microhenries
L12	Cathode choke	1.2Ω		2E93	19-1001	TV-189	4804	1.5Microhenries; IRC part no. CLA
L13	Series Peaking coil	14Ω		20E363-25	19-3250	TV-185	6181	270Microhenries
L14	4.5MC trap	3.5Ω		20E785	20-1004	TV-151	1470	
L15	Shunt peaking coil	18Ω		20E363-28	19-3880			800Microhenries
L16	Sound IF	3.3Ω		20E785	20-1005	TV-151	1469	
L17	Ratio Det.	4.3Ω	L. 2DCT	20E783	17-4023	TV-110	1468	Tertiary windings. 6Ω
L18	Horiz. Osc.	100Ω		20E831	19-1576	TV-163	6210	

* Use one winding only.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT (000 Ω's)	AIRLINE PART No	Stancor PART No	Merit PART No.	Triad PART No	Halldorson PART No	Thordorson PART No
L19	220A	65. 4Ω	1. 91H	22E75-2	C-3336 ①	C-21X	C503T ①	26G44 ①	

① Drill one new mounting hole

FUSES

ITEM No.	TYPE	RATING	AIRLINE PART No. FUSE	AIRLINE PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	3A 125V	40E8-10	55E57	312003 (3A-3AG-S/B)	342001	MDL3	HKP

CRYSTAL DIODES

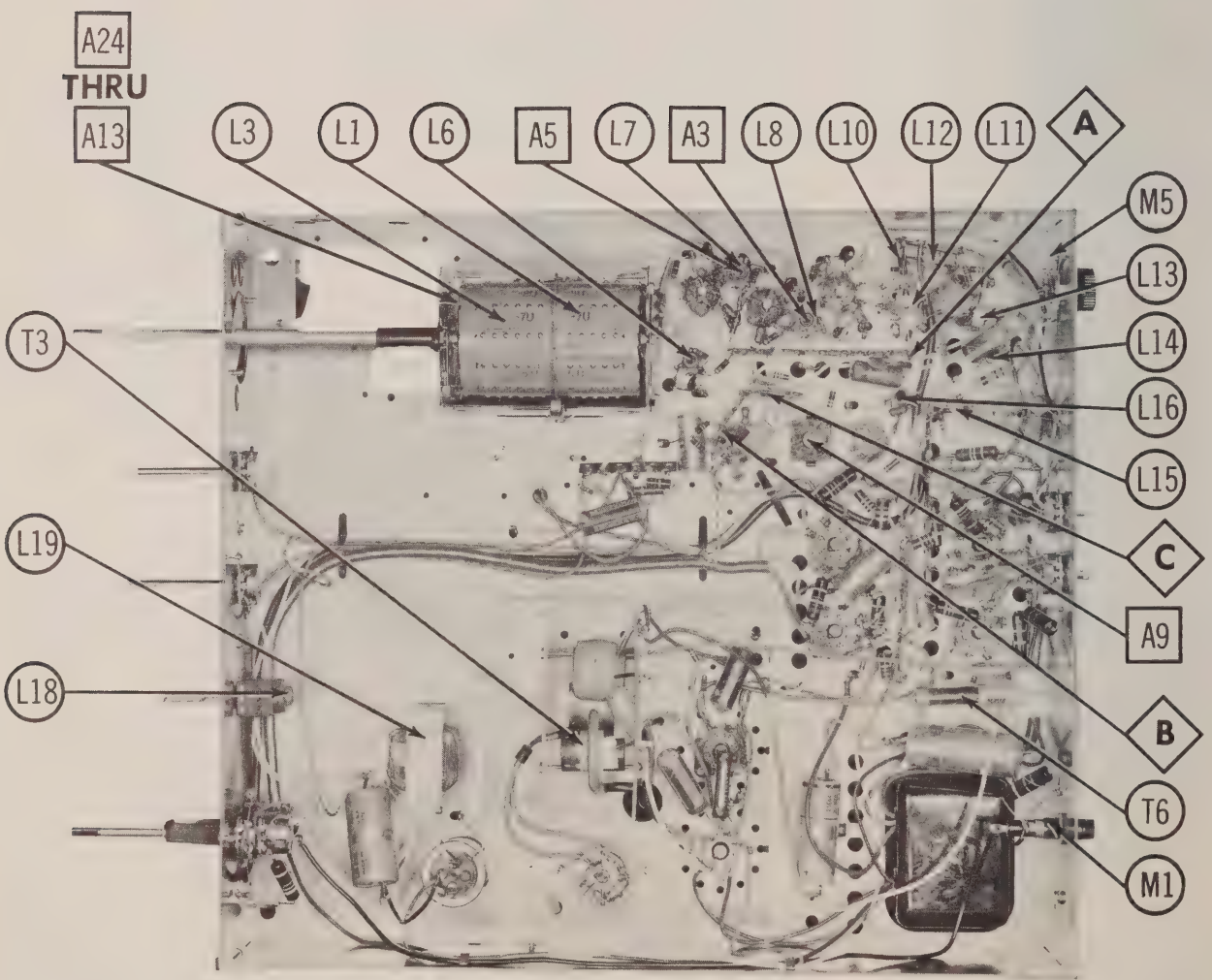
ITEM No.	ORIG. TYPE	AIRLINE PART No.	SYLVANIA PART No.	FEDERAL PART No.	NOTES
M2	1N60	9SE1	1N60 or 1N132	1N60 or 1N64A	Video Det.

AIRLINE MODELS GSE-5001A, GSE-5004A, GSE-5101A, GSE-5104A

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M3	Tuner	20E950	VHF Models GSE-5001 & GSE-5004
	Tuner	20E976	UHF-VHF Models GSE-5101 & GSE-5104
M4	40MC Trap Assy.	31K-225-01	VHF Ant. Input
M5	Switch	29E30-2	
M7	Focus Magnet		Includes centering device-used on some versions
M8	Centering Magnet		Part of yoke (T5)
M9	Ion Trap	15E174-4	Alternate part #15E174-6
	Knob	37E89-4	Fine tuning - Models GSE-5001 & GSE-5004
	Knob	37E89-6	Fine tuning - Models GSE-5101 & GSE-5104
	Knob	37E89-5	Contrast - Models GSE-5001 & GSE-5004
	Knob	37E89-7	Contrast - Models GSE-5101 & GSE-5104
	Knob	37E59-14	Channel Selector - Models GSE-5001 & GSE-5004
	Knob	37E59-16	Channel Selector - Models GSE-5101 & GSE-5104
	Knob	37E59-15	On/off volume - Models GSE-5001 & GSE-5004
	Knob	37E59-17	On/off volume - Models GSE-5101 & GSE-5104
	Knob	37E24-2	Locality Adjuster
	Mask	36E98-2	Includes rubber gasket
	Safety Glass	9E50-2	
	Back Cover	20E957-12	With line cord - Models GSE-5001 & GSE-5004
	Back Cover	20E957-13	With line cord - Models GSE-5101 & GSE-5104



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. [illegible]
DENVER, [illegible]

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V13, V14, V15 and V16. Check waveform W13.

If Satisfactory	If Unsatisfactory
Check T3, T5A, T6, C84, C83, R88 and other associated components.	Check L18, C80, C79, C82, R84, R82, R81 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V14, V15 and V17. Check adjustment B1. Check C82, C83, R88 and other associated components.

BLOOMING

Check by substitution V14, V15, V16 and V17. Check R90, R88, C82 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

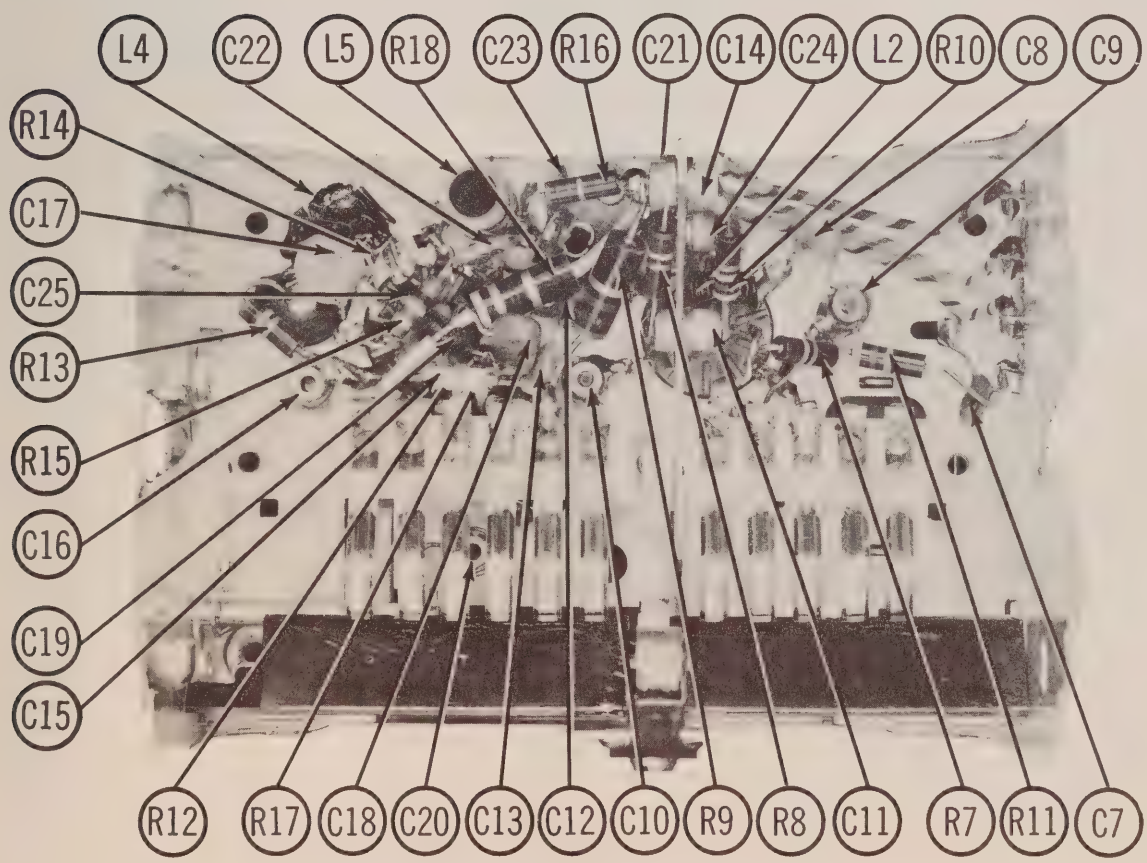
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



RF TUNER BOTTOM VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removal of the Channel Selector and Fine Tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the left of the Channel Selector shaft.

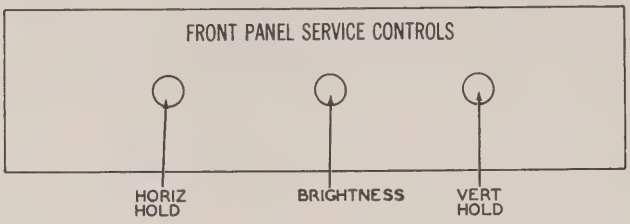
PICTURE TUBE SAFETY GLASS CLEANING

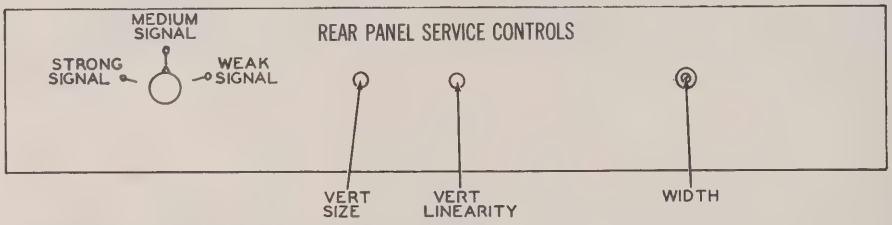
For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions.)

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION





HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the front panel service controls. Adjust the horizontal hold control until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector Buzz, adjust the Ratio Detector Secondary L17 located on top of chassis. (See tube placement chart.)

FUSES

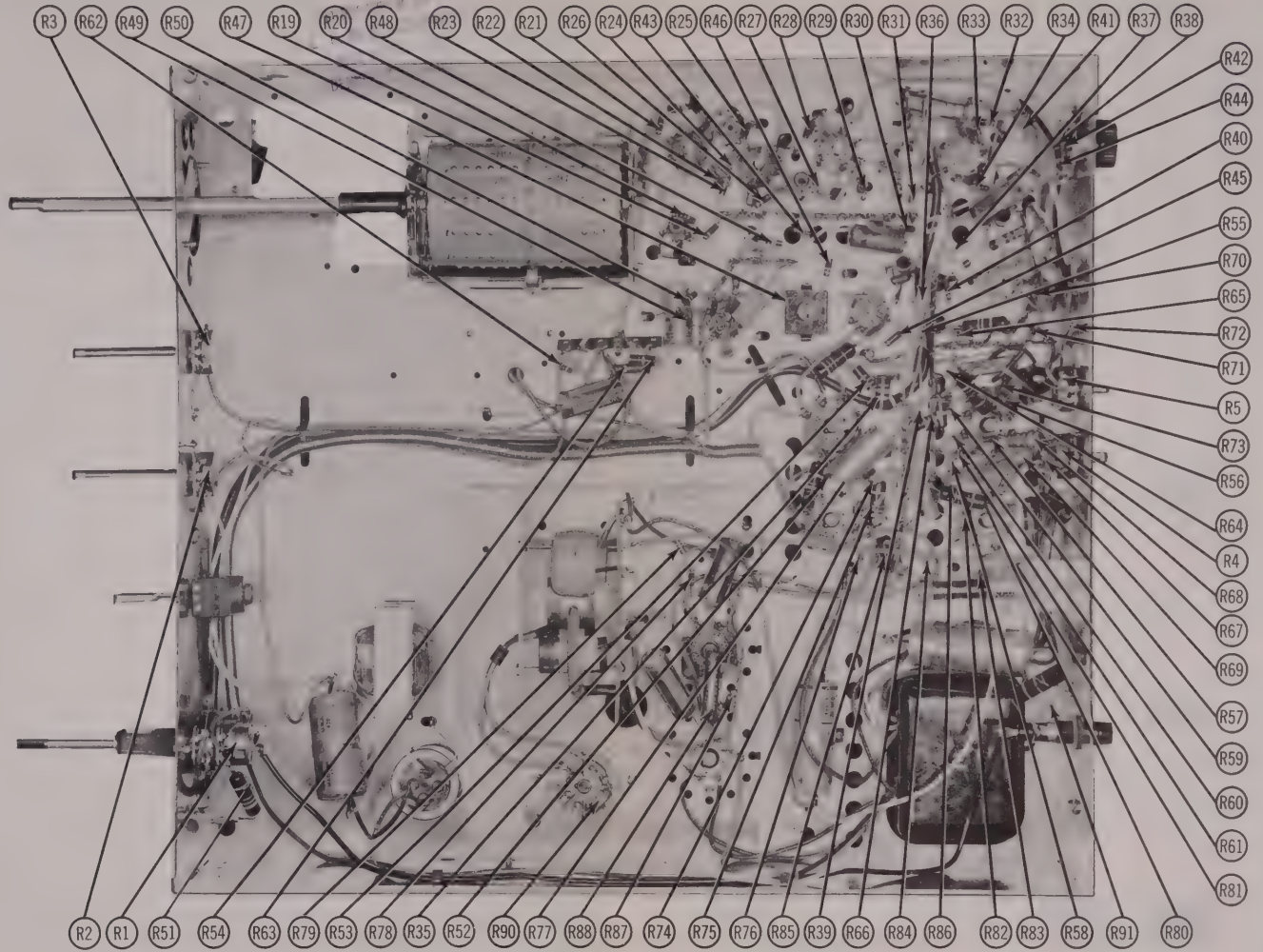
One fuse is used for L. V. Power Supply protection. (For location see Tube Placement Chart.)

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

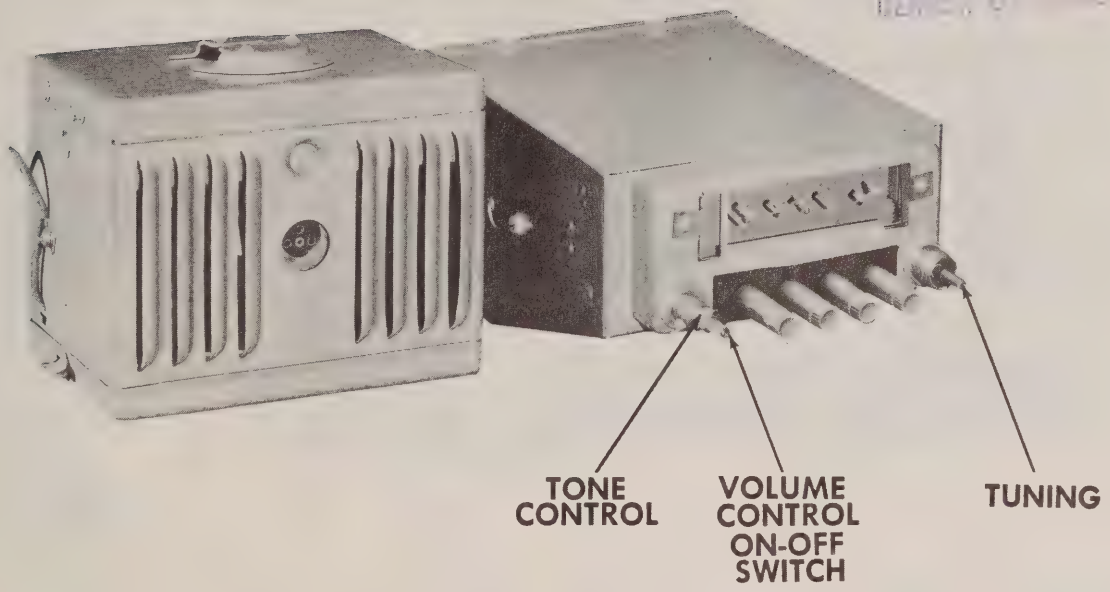
DISASSEMBLY INSTRUCTIONS

1. Remove 4 push-on type control knobs from front panel.
2. Remove 7 metal screws. Remove rear cover.
3. Loosen 2 metal screws from antenna bracket. Remove bracket.
4. Disconnect 2 speaker leads from output transformer.
5. Remove 4 speaker nuts. Remove speaker.
6. Remove 4 chassis bolts, remove chassis.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ALLSTATE
MODEL 6263 (Ch. 528.6263)



ALLSTATE
MODEL 6263 (Ch. 528.6263)

TRADE NAME	Allstate Model 6263 (Ch. 528.6263)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	Battery Operated Universal Automobile Superheterodyne Receiver
TUBES (Six)	Types 12BA6 RF Amp., 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det-AFC-AF Amp., 12V6 Output, 12X4 Rectifier

POWER SUPPLY 12 Volt Storage Battery RATING 2.5 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST 535KC - 1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to chassis.	262KC (400~ Mod)	High frequency end stop.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2	Fig. 1	Thru dummy (Fig. 1) to antenna receptacle.	1610KC	"	"	A5	"
3	"	"	1400KC	Tune to 1400KC signal.	"	A6, A7	"

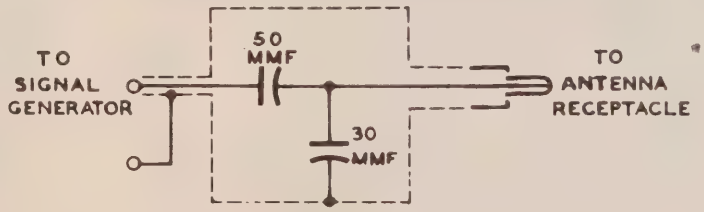


FIG. 1

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ALLSTATE PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	12BA6	12BA6	7BK	RF Unit
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amp.	12BA6	12BA6	7BK	
V4	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V5	Output	12V6GT	12V6GT	7S	Power Unit
V6	Rectifier	12X4	12X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

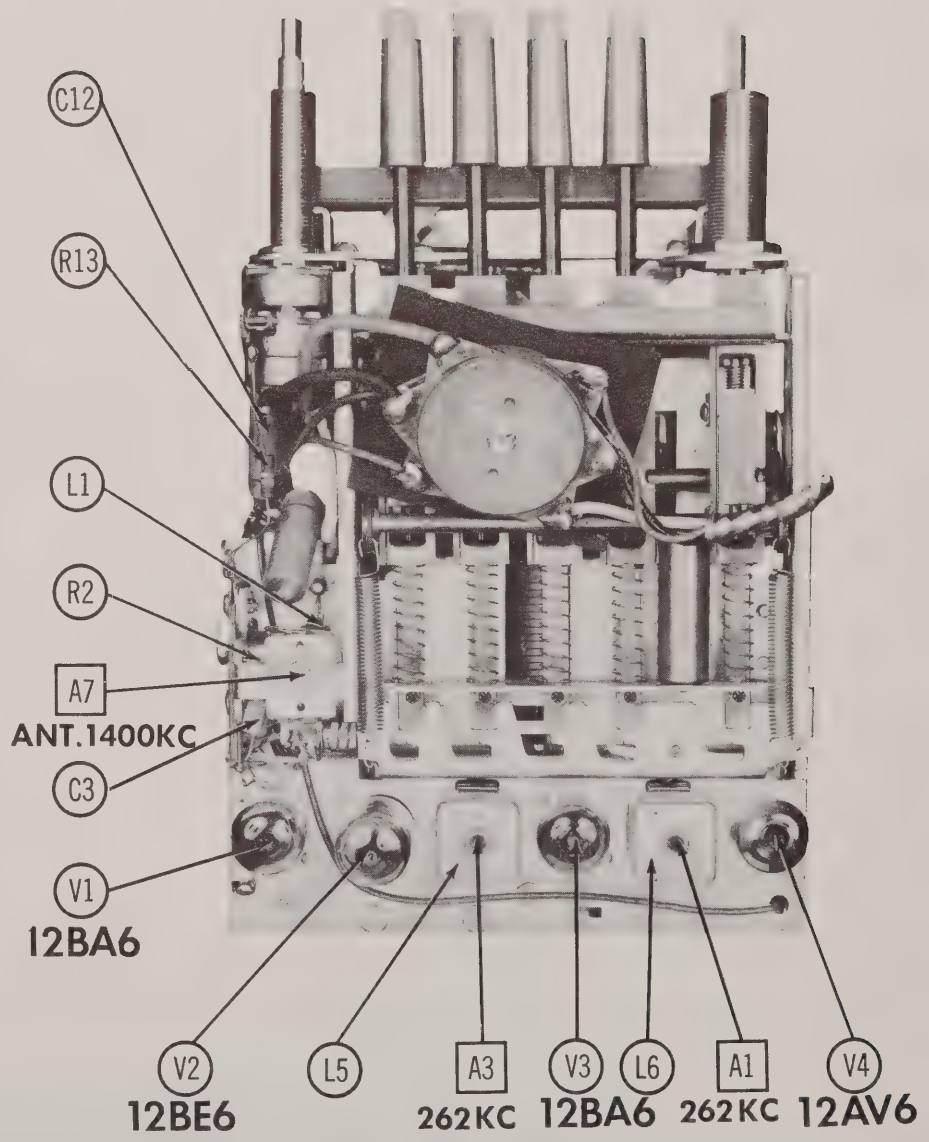
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ALLSTATE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	35	400	A18-300	AFH3-133		C106		FP346	TVL-3786	
B	25	350								
C	20	25								
C2	.05	200	A16-197	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3	100	500	A15-188	P1468-0001		5W5T1		MC235	MS-31	
C4	10000		A15-211	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C5	.05	400	A16-189	P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C6	.05	400	A16-189	P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C7	5000		A16-177	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C8	10		A15-197	SI10N750	TCN-10	N018	N750K-100	NT-541	5TCU-Q1	
C9	270		A15-215	SI270N750	TCN-270	N053	N750K-271			
C10	50		A15-194	SI50N750	TCN-50	N034	N750K-500			
C11	220	500	A15-243	P1468-0002		5W5T22		MC237	1FM-32	
C12	.01	400	A16-192	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C13	.005	600	A16-190	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C14	.01	400	A16-192	P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C15	.02	600	A16-206	P688-02	D6-203	CUB6S2		PT622	6TM-S2	
C16	5000		A16-177	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 1
C17	5000		A16-177	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C18	.005	600	A16-190	P688-005	D6-502	CUB6D5	GP2-333-502	PT625	6TM-D5	
C19	5000		A16-177	BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C20	.5	100	A16-215	P185-5		PJ2P5		RF480	HC-3	
C21	.5	100	A16-215	P185-5		PJ2P5		RF480	HC-3	
C22	.5	100	A16-215	P185-5		PJ2P5		RF480	HC-3	
C23	.2	400	A16-188	P488-2		CUB4P2		PT402	4TM-P2	
C24	.006	1600	A16-261	P1688-006		CUB16D6		PT1626	MB-D6	

Note 1 Not used in all versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ALLSTATE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	300KΩ	½	A24-183			F1-41	UF55A	Tone Panel
B	500KΩ	½				R2-46	UR55-T254	Volume Tapped at 170KΩ Rear
C	Shaft					AK-26	EB158	Attach to R1A
D	Switch					KB-4	US-26	Attach to R1B

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ALLSTATE PART No.	IRC PART No.	
R2	68KΩ	½	A60-845	BTS-68K	
R3	2.2Meg	½	A60-726	BTS-2.2Meg	
R4	220Ω	½	A60-960	BTS-220	
R5	10KΩ	½	A60-764	BTS-10K	
R6	10Meg	½	A60-728	BTS-10Meg	
R7	1Meg	½	A60-668	BTS-1Meg	
R8	22KΩ	½	A60-659	BTS-22K	
R9	22KΩ	1	A60-852	BTA-22K	
R10	56Ω	½	A60-806	BTS-56	
R11	47KΩ	½	A60-730	BTS-47K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ALLSTATE PART No.	IRC PART No.	
R12	2.2Meg	½	A60-726	BTS-2.2Meg	
R13	68KΩ	½	A60-845	BTS-68K	
R14	10Meg	½	A60-728	BTS-10Meg	
R15	200KΩ	½	A60-667	BTS-200K	Note
R16	470KΩ	½	A60-731	BTS-470K	
R17	270Ω	1	A60-754	BTA-270	
R18	470Ω	1	A60-694	BTA-470	
R19	10KΩ	1	A60-698	BTA-10K	
R20	10KΩ	1	A60-698	BTA-10K	
R21	470Ω	1	A60-772	BTA-470	

Note: Some versions may use a 220KΩ in this application.

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	ALLSTATE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	12.6VCT @ 1.3A	446VCT .043A			C80-296					

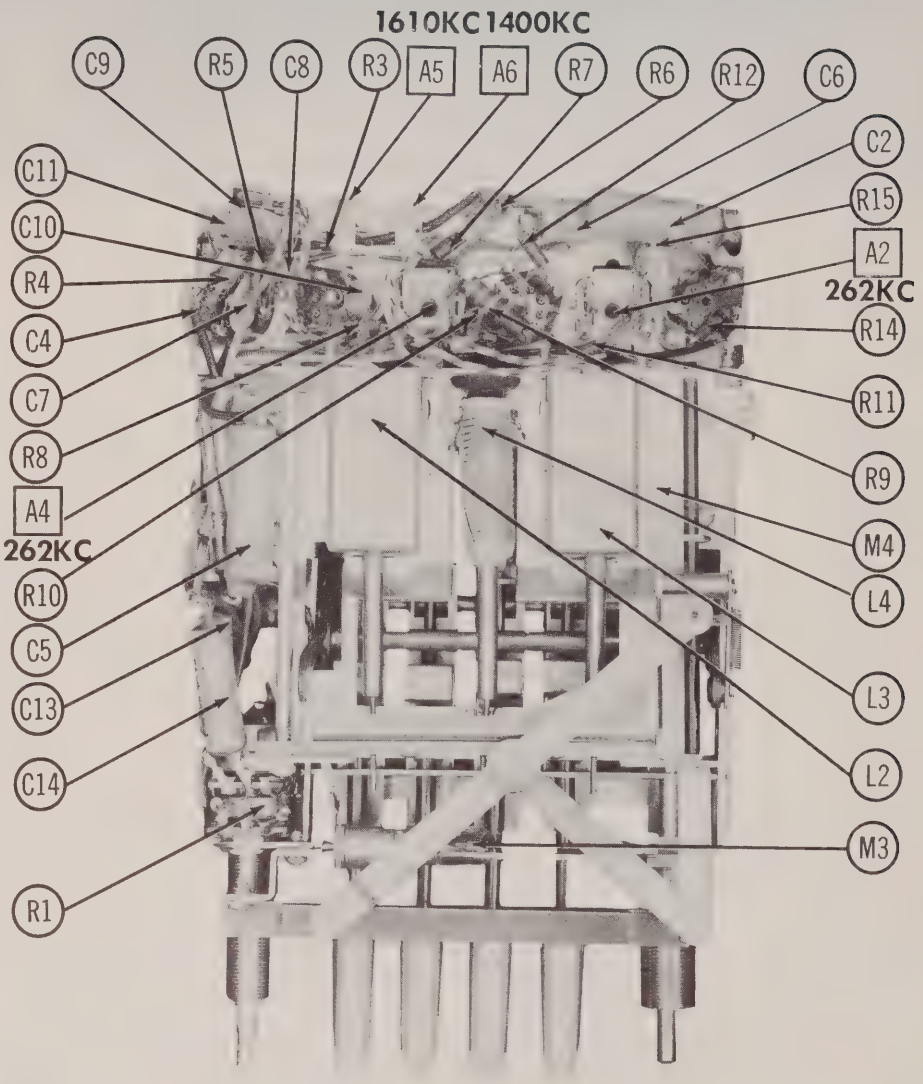
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ALLSTATE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	4.8KΩ	3.8Ω	B80-251	A-3823	A-3019	S-5Z	Z1002	26S49	

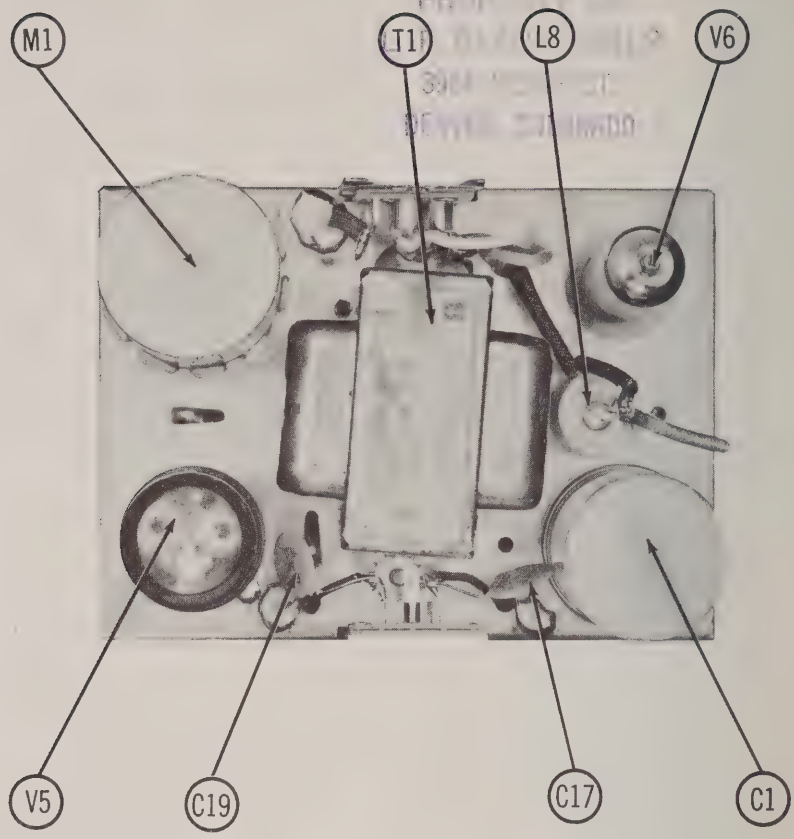
SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ALLSTATE PART No.	VIKING PART No.	QUAM PART No.	
SP1	7"	PM	3.8Ω	C79-410	7J9	7A21	
	6" X 9"	PM	3.8Ω	C79-409	69J9	69A2	Alternate speaker

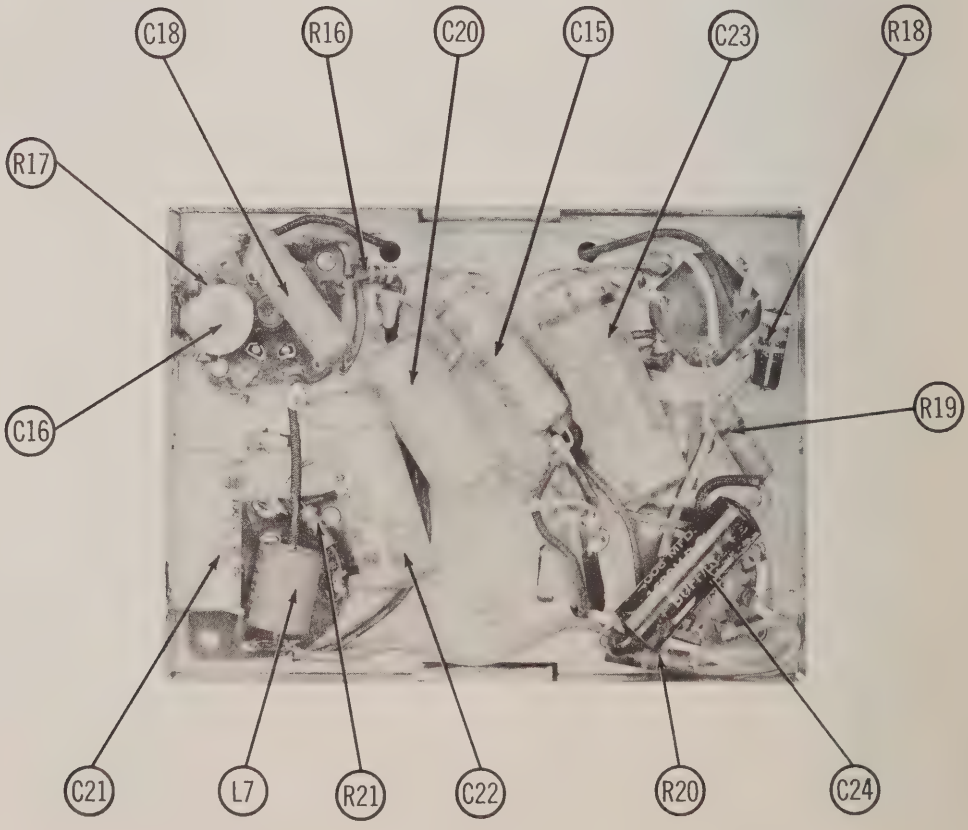
CHASSIS—BOTTOM VIEW

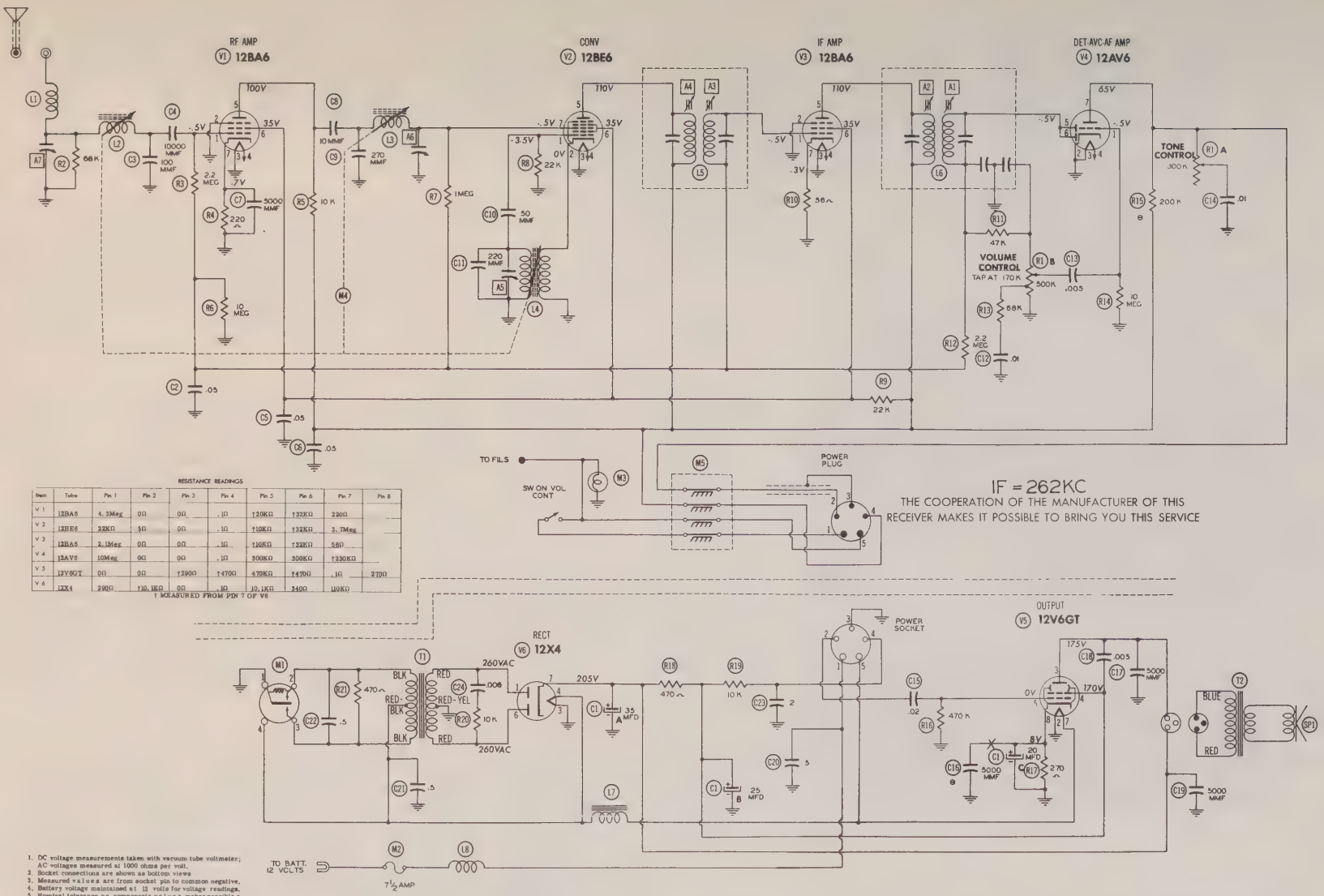


12X4


M1
T1
L8
V6
V5
C19
C17
C1

12V6GT


C18
R16
C20
C15
C23
R18
R17
C16
R19
C21
L7
R21
C22
R20
C24



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12BA6	4.3Meg	0Ω	0Ω	.1Ω	†20KΩ	†32KΩ	230Ω	
V 2	12BE6	22KΩ	5Ω	0Ω	.1Ω	†10KΩ	†32KΩ	3.7Meg	
V 3	12BA6	2.1Meg	0Ω	0Ω	.1Ω	†10KΩ	†32KΩ	58Ω	
V 4	12AV6	10Meg	0Ω	0Ω	.1Ω	300KΩ	300KΩ	†230KΩ	
V 5	12V6GT	0Ω	0Ω	†290Ω	†470Ω	470KΩ	†470Ω	.1Ω	270Ω
V 6	12X4	390Ω	†10.1KΩ	0Ω	.1Ω	10.1KΩ	340Ω	110KΩ	

† MEASURED FROM PIN 7 OF V6

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12 volts for voltage readings.
5. Nominal tolerance on components values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ALLSTATE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Loading Coil	.6Ω		A10-527	19-1005		4612	
L2	Ant. Coil	9Ω						Part of tuner Assembly
L3	RF Coil	11Ω						Part of tuner Assembly
L4	Osc. Coil	.3Ω	5Ω					Part of tuner Assembly
L5	Input IF	42Ω	42Ω	A10-540	16-6752	BC-350	12-H1	
L6	Output IF	42Ω	40Ω	A10-537	16-6754	BC-354	12-H6	
L7	Vib. Hash Choke	0Ω		A33-239	19-1005		4612	
L8	Fil. Choke	0Ω		A33-234	19-1005*			

* Leads sufficient mounting support.

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FRE-QUENCY	REPLACEMENT DATA				NOTES
				ALLSTATE PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	12.6	115∿	A34-107	3301	G859	3301	

FUSES

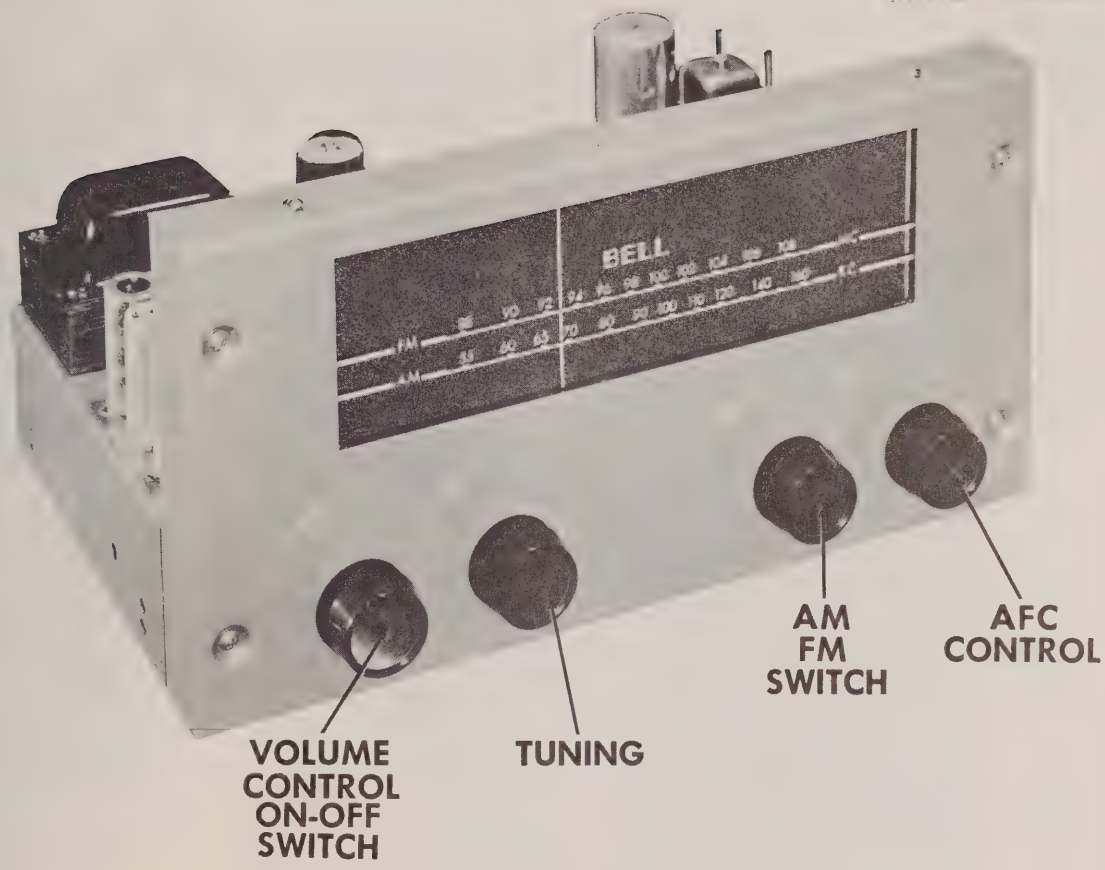
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			ALLSTATE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	7.5A 32V	A43-16	S84-233	31107.5 (7.5A-3AG)	155020	AGW 7½	HDH-A

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	ALLSTATE PART No.	NOTES
M3	Dial Light	A89-12	#1815, Bayonet
M4	Tuner	S84-470	Permeability; Includes carriage, slugs, etc.
M5	Spark Plate		
	Trimmer Cap.	A20-148	Ant.
	Trimmer Cap.	A20-147	Dual - RF & Osc.
	Knob	B52-385	Tuning
	Knob	B52-384	On-Off-Volume
	Knob	B52-383	Tone
	Dial Scale	B67-547	
	Pusher Nut	A56-141	Manual Tuning
	Pusher Nut	A56-152	Push Button Tuning - 4 used
	Pusher Rod	A75-75	Manual Tuning
	Pushbutton and Rod Assembly	S84-355	

BELL SOUND
MODEL 2210



BELL SOUND
MODEL 2210

TRADE NAME	Bell Sound Model 2210	
MANUFACTURER	Bell Sound Systems, Inc., 555 Marion Rd., Columbus, Ohio	
TYPE SET	AC Operated AM-FM Superheterodyne Tuner For Custom Installation	
TUBES	Eleven	
POWER SUPPLY	105-125 Volts AC-60 Cycles	RATING .42 Amp. @ 117 Volts AC
TUNING RANGE - BROADCAST	535KC-1650KC	FREQ. MOD. 88MC-108MC

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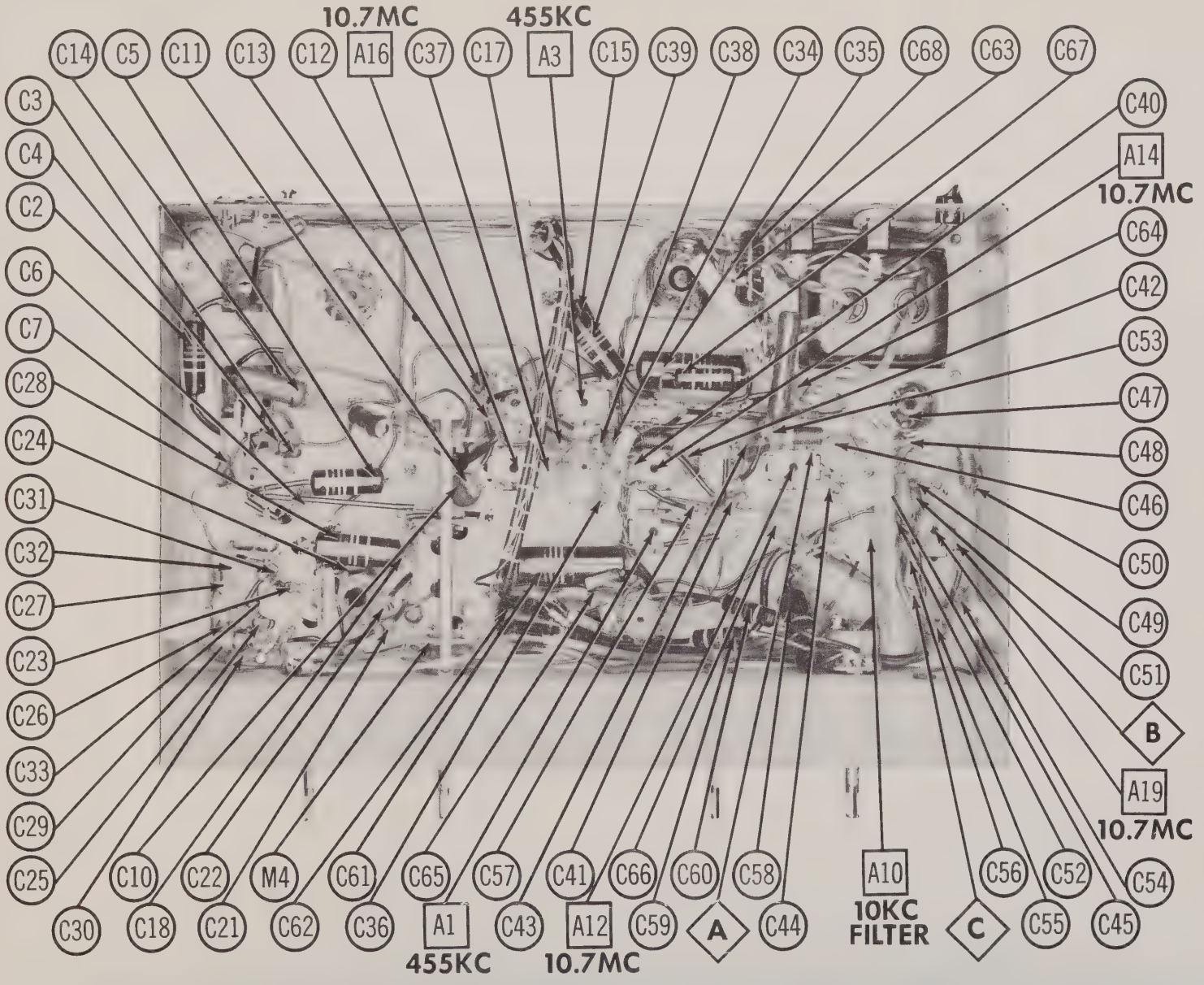
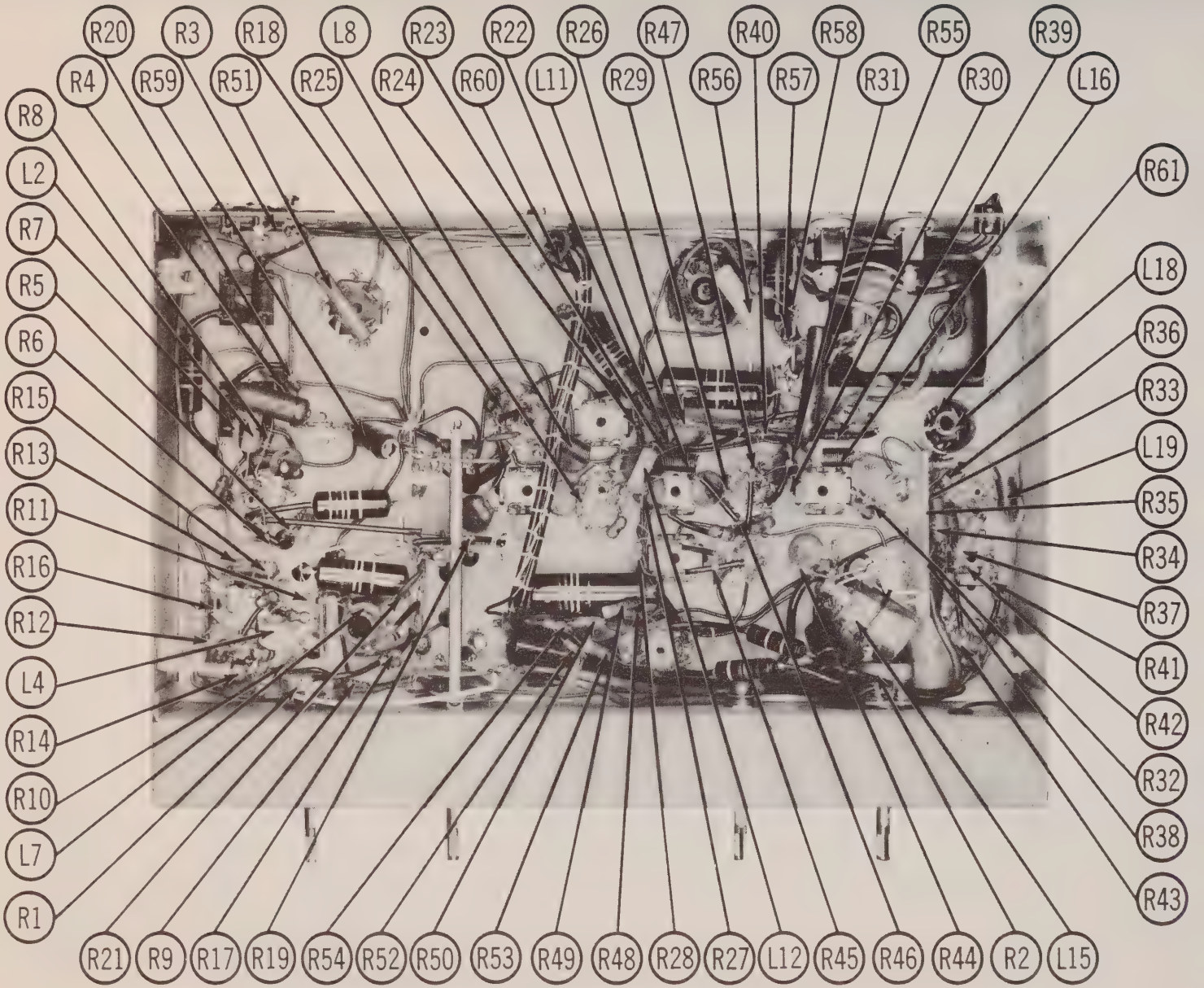
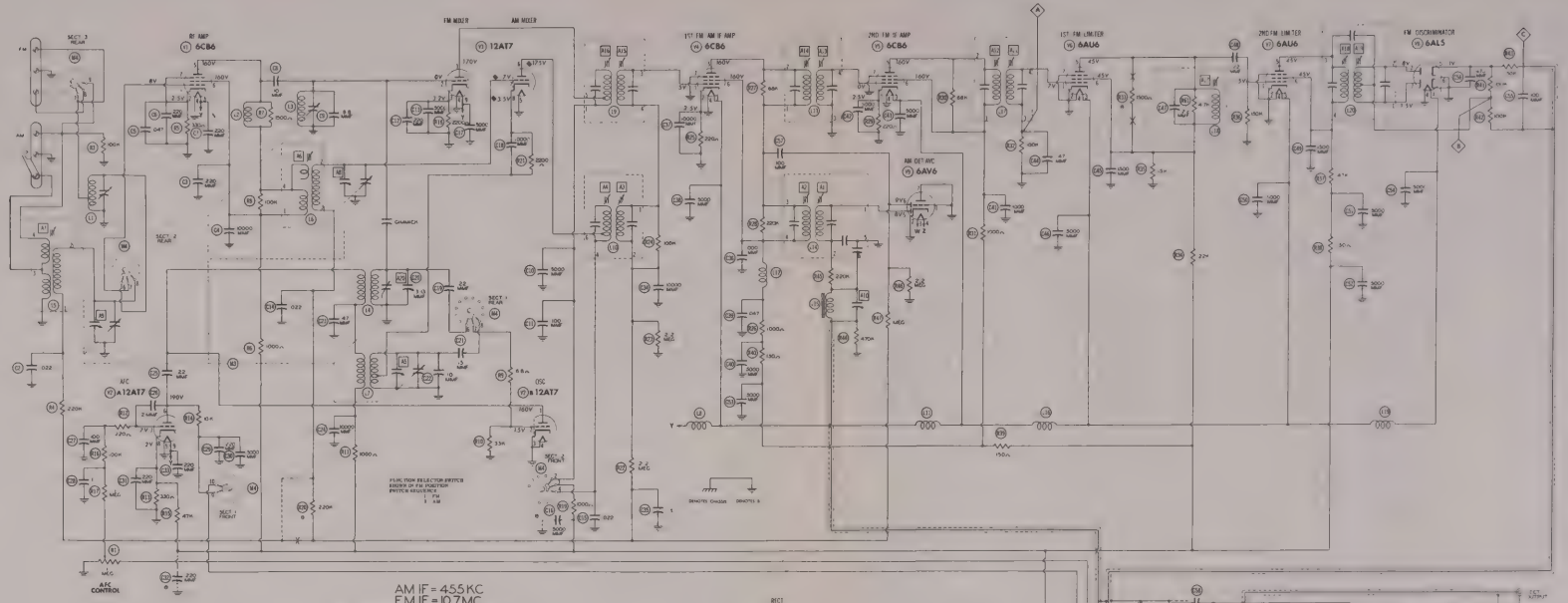


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

BELL SOUND
MODEL 2210



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6CB6	0Ω	330Ω	.1Ω	0Ω	†3.4KΩ	†3.4KΩ	330Ω		
V 2	12AT7	†3KΩ	33KΩ	0Ω	0Ω	0Ω	†12.5KΩ	1.2Meg	330Ω	.1Ω
V 3	12AT7	†2.8KΩ	.1Ω	2.2KΩ	0Ω	0Ω	*†2.9KΩ	*3.4Meg	*2.2KΩ	.1Ω
V 4	6CB6	1.6Meg	220Ω	.1Ω	0Ω	†3KΩ	†3KΩ	0Ω		
V 5	6CB6	1Ω	220Ω	.1Ω	0Ω	†2.9KΩ	†2.9KΩ	0Ω		
V 6	6AV6	100KΩ	0Ω	.1Ω	0Ω	†17.5KΩ	†17.5KΩ	0Ω		
V 7	6AU6	150KΩ	0Ω	.1Ω	0Ω	†47KΩ	†47KΩ	0Ω		
V 8	6AU6	150KΩ	0Ω	.1Ω	0Ω	†47KΩ	†47KΩ	0Ω		
V 9	6AL5	0Ω	100KΩ	.1Ω	0Ω	200KΩ	0Ω	100KΩ		
V 10	6AV6	0Ω	0Ω	15KΩ	15KΩ	270KΩ	2.2Meg	0Ω		
V 11	12AX7	†2.5KΩ	500KΩ	22KΩ	15KΩ	15KΩ	2.5KΩ	500KΩ	22KΩ	15KΩ
V 11	6X5GT	INF	16KΩ	95Ω	INF	95Ω	INF	16KΩ	20KΩ	

ALL READINGS TAKEN IN "FM" POSITION UNLESS NOTED
*TAKEN IN "AM" POSITION

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269-4

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

With tuning gang fully closed, set dial pointer 1/4" to the left of the index mark at "55" on the dial scale.
Allow 15 minute warm-up period for tuner and equipment.

AM ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 7 (grid) of 12AT7 (V3). Low side to chassis.	455KC (400∿Mod)	AM	Point of non-interference	Across audio output jack	A1, A2, A3, A4	Adjust for maximum output.
2.	220MMF	High side to antenna terminal lug. Low side to chassis.	1500KC	"	1500KC	"	A5	"
3.	"	"	600KC	"	Tune to 600KC signal	"	A6, A7	"
4.	"	"	1400KC	"	Tune to 1400KC signal	"	A8, A9	Adjust for maximum output. Repeat steps 3 and 4.

10KC FILTER ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
5.	220MMF	High side to antenna terminal lug. Low side to chassis.	1400KC (10KC Mod)	AM	Tune to 1400KC signal	Across audio output jack	A10	Adjust for minimum output.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Use only enough signal generator output to provide usable signal on VTVM.
Turn AFC control fully counter clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	.01MFD	High side to pin 2 (grid) of 12AT7 (V3). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A11, A12 A13, A14 A15, A16	Adjust for maximum deflection.
7.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A17, A18	"
8.	"	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A19	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6	.01MFD	High side to pin 2 (grid) of 12AT7 (V3). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference.	Vert. amp. to point Ⓐ. Low side to chassis.	A11, A12, A13, A14 A15, A16	Adjust for curve of maximum amplitude and symmetry as in Fig. 1.
7	"	"	"	"	"	Vert. amp. to point Ⓑ. Low side to chassis.	A17, A18	Adjust for curve of maximum amplitude and symmetry as in Fig. 1.
8	"	"	"	"	"	Vert. amp. to point Ⓒ. Low side to chassis.	A19	Adjust so that 10.7MC occurs at center of crossover lines as in Fig. 2. SLIGHTLY retouch A18 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
9	270Ω carbon resistor	High side thru 270Ω to FM antenna terminal lug. Low side to chassis.	106MC	FM	106MC	DC probe to point Ⓐ. Common to chassis.	A20	Adjust for maximum deflection.
10	"	"	90MC	"	Tune to 90MC signal.	"	L1, L3	Compress or expand L1 and L3 for maximum deflection. Repeat step 9.

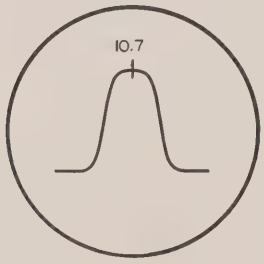


FIG. 1

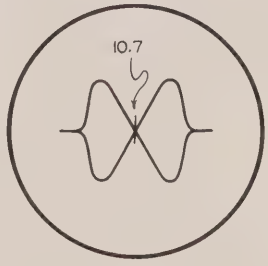


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

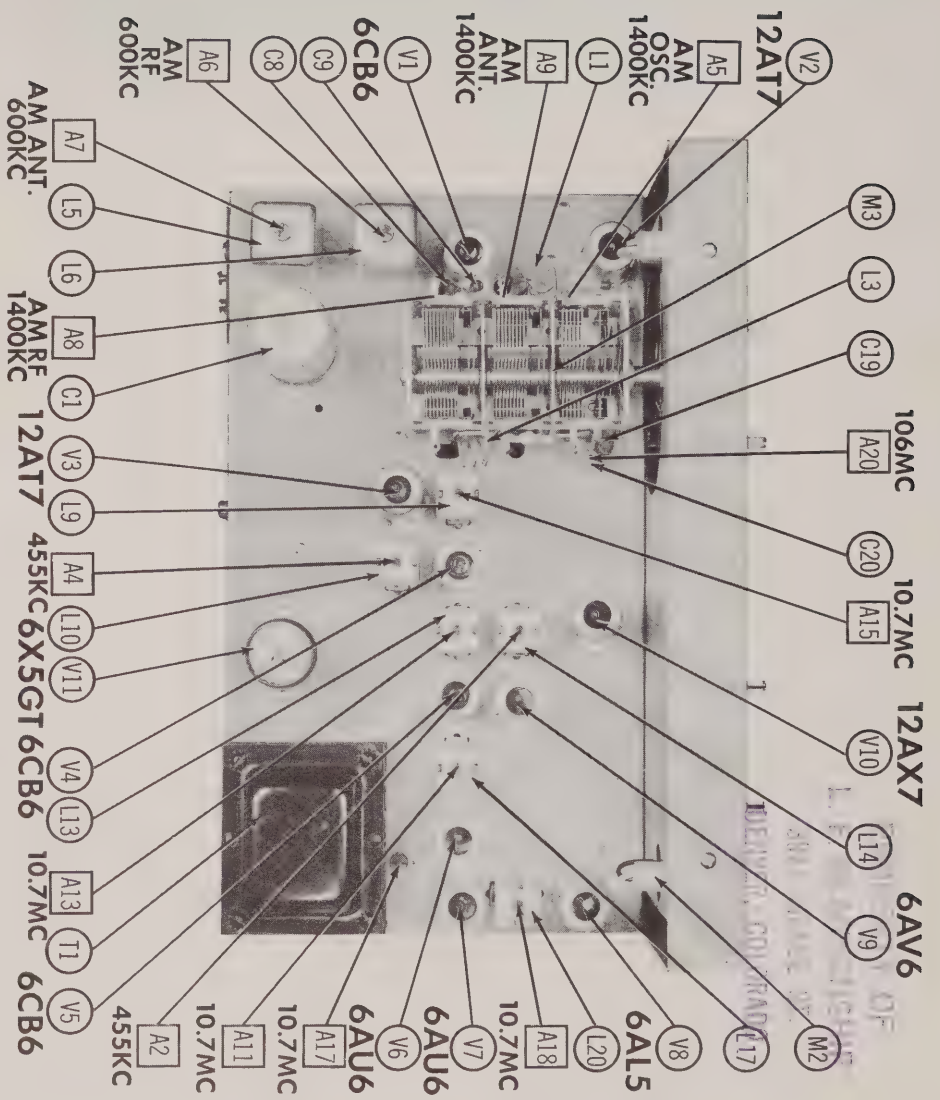
ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		BELL SOUND PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6CB6	6CB6	7CM	
V2	Osc-AFC	12AT7	12AT7	9A	
V3	FM Mixer-AM Mixer	12AT7	12AT7	9A	
V4	1st FM AM IF Amp.	6CB6	6CB6	7CM	
V5	2nd FM IF Amp.	6CB6	6CB6	7CM	
V6	1st FM Limiter	6AU6	6AU6	7BK	
V7	2nd FM Limiter	6AU6	6AU6	7BK	
V8	FM Disc.	6AL5	6AL5	6BT	
V9	AM Det-AVC	6AV6	6AV6	7BT	
V10	Cath. Follower	12AX7	12AX7	9A	
V11	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	BELL SOUND PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	300		AFH4-93		D092		FP419.5	TVL-4774	
B	■40	300								
C	20	300								
D	▲30	300								
C2	.022	400		P488-022	DF-203	CUB4S22	817-02	PT4122	4TM-S22	
C3	220			SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C4	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C5	.047	400		P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C6	220			SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C7	220			SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C8	10			SI10	D6-100	TP09	GP1K-100	UC-541	5GA-Q1	
C9	6.8			SI6.8NP0	TCZ-6.8	TZ08	NP0A-6R8	ZT-5568	5TCCB-V68	
C10	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C11	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C12	220			SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C13	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C14	.022	400		P488-022	DF-203	CUB4S22		PT4122	4TM-S22	
C15	.022	400		P488-022	DF-203	CUB4S22		PT4122	4TM-S22	
C16	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 1
C17	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C18	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C19	22			SI22NP0	TCZ-22	TZ14	NP0K-220	ZT-5422	5TCC-Q22	
C20	3-13									
C21	15			SI15	D6-150	TP11	GP1K-150	UC-5415	5GA-Q15	
C22	10			SI10	D6-100	TP09	GP1K-100	UC-541	5GA-Q1	
C23	47			SI47	D6-470	TP22	GP1K-470	UC-5447	5GA-Q47	
C24	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C25	22			SI22NP0	TCZ-22	TZ14	NP0K-220	ZT-5422	5TCC-Q22	
C26	2			SI2.2NP0	TCZ-2.2	TZ05	NP0A-2.2		5TCCB-V22	
C27	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C28	.1	400		P488-1	DF-104	CUB4P1			4TM-P1	
C29	220			SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C30	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C31	220			SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C32	220			SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	Note 1
C33	220			SI220	D6-221	TP39	GP2K-221	UC-5322	5GA-T22	
C34	10000			BPD-01	DD-103	K080	811-01	DC-511	5HK-S1	
C35	.15	400		P488-15		CUB4P15		PT4015	4TM-P15	
C36	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C37	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C38	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C39	.047	400		P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C40	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C41	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C42	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C43	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C44	47			SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C45	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C46	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C47	22			SI22	D6-220	TP22	GP1K-220	UC-5422	5GA-Q22	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA Bell Sound PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C48	22			SI22	D6-220	TP22	GP1K-220	UC-5422	5GA-Q22	
C49	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C50	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C51	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C52	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C53	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C54	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C55	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C56	470			SI470	D6-471	TP46	GP2K-471	UC-5347	5GA-T47	
C57	100			SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C58	.1	400		P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C59	.01	400		P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C60	.01	400		P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C61	.22	200		P288-22		CUB2P22		PT4022	2TM-P22	
C62	.22	200		P288-22		CUB2P22		PT4022	2TM-P22	
C63	1000			SI1000	D6-102	TP52	GP2L-102	UC-521	5HK-D1	
C64	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C65	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 1
C66	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 1
C67	.01	400		P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C68	.01	600		P688-01	D6-103	CUB6S1	GP2-333-103	PT611	6TM-S1	

Note 1. Not used in some versions.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA BELL SOUND PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	23S738A	Q13-137	A47-1Meg-Z	AB-70	U-53	AFC
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	500KΩ	½	23S737	Q13-133	A47-500K-Z	AB-60	U-48	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R2A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA BELL SOUND PART No.	IRC PART No.	NOTES
R3	100KΩ	½		BTS-100K	
R4	220KΩ	½		BTS-220K	
R5	330Ω	½		BTS-330	
R6	1000Ω	½		BTS-1000	
R7	1500Ω	½		BTS-1500	
R8	100KΩ	½		BTS-100K	
R9	6.8Ω	½			
R10	33KΩ	½		BTS-33K	
R11	1000Ω	½		BTS-1000	
R12	220Ω	½		BTS-220	
R13	330Ω	½		BTS-330	
R14	10KΩ	1		BTA-10K	
R15	47KΩ	1		BTA-47K	
R16	100KΩ	½		BTS-100K	
R17	1Meg	½		BTS-1Meg	
R18	2200Ω	½		BTS-2200	
R19	1000Ω	½		BTS-1000	
R20	220KΩ	½		BTS-220K	Note 1
R21	2200Ω	½		BTS-2200	
R22	2.2Meg	½		BTS-2.2Meg	
R23	2.2Meg	½		BTS-2.2Meg	
R24	100KΩ	½		BTS-100K	
R25	220Ω	½		BTS-220	
R26	1000Ω	½		BTS-1000	
R27	68KΩ	½		BTS-68K	
R28	220KΩ	½		BTS-220K	
R29	220Ω	½		BTS-220	
R30	68KΩ	½		BTS-68K	
R31	1000Ω	½		BTS-1000	
R32	100KΩ	½		BTS-100K	
R33	1500Ω	½		BTS-1500	Note 1
R34	22KΩ	1		BTA-22K	
R35	15KΩ	½		BTS-15K	
R36	150KΩ	½		BTS-150K	
R37	47KΩ	1		BTA-47K	
R38	150Ω	½		BTS-150	
R39	150Ω	½		BTS-150	
R40	150Ω	½		BTS-150	
R41	100KΩ	½		BTS-100K	
R42	100KΩ	½		BTS-100K	
R43	150KΩ	½		BTS-150K	
R44	470KΩ	½		BTS-470K	
R45	220KΩ	½		BTS-220K	
R46	2.2Meg	½		BTS-2.2Meg	
R47	1Meg	½		BTS-1Meg	
R48	470KΩ	½		BTS-470K	
R49	470Ω	1		BTA-470	
R50	22KΩ	½		BTS-22K	
R51	2200Ω	2		BTB-2200	
R52	470KΩ	½		BTS-470K	
R53	470Ω	1		BTA-470	
R54	22KΩ	½		BTS-22K	
R55	1500Ω	10		1 3/4A-1500	
R56	220Ω	2		BTB-220	
R57	100KΩ	½		BTS-100K	
R58	15KΩ	½		BTS-15K	
R59	.47Ω	10			
R60	1Meg	½		BTS-1Meg	Note 1
R61	4700Ω	½		BTS-4700	

Note 1: Not used in some versions.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA BELL SOUND PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC	422VCT	6.3VAC	6.3AC						
	ⓐ .42A	.056ADC	ⓐ 1.15A	ⓐ 2.75A						

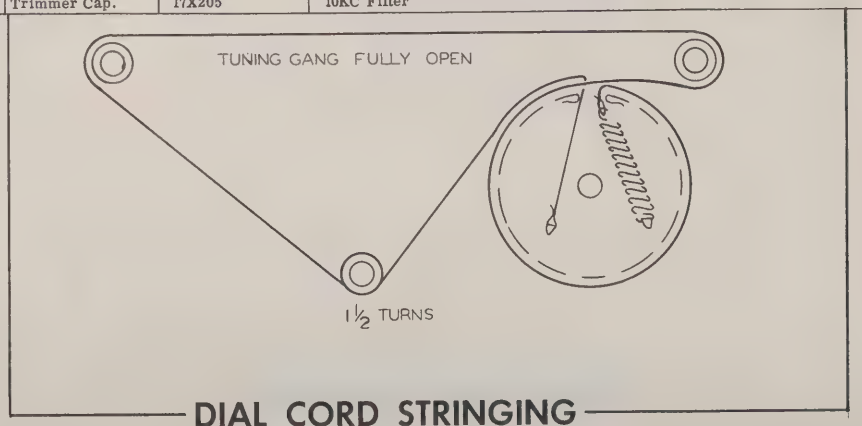
COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA BELL SOUND PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coil	0Ω						
L2	RF Choke	3Ω			19-1003		4608	3.3Microhenries; IRC part no. CLA
L3	FM RF Coil	0Ω						
L4	FM Osc. Coil	0Ω	0Ω					
L5	AM Ant. Coil	30Ω	5Ω		14-7413▲	BC-383▲	73-A▲	
L6	AM RF Coil	105Ω	5.5Ω					Tertiary winding
L7	AM Osc. Coil	1.4Ω	6.3Ω♦		14-1040†	BC-381†	70-Osc▲	
L8	Fil. Choke	0Ω			19-1001	BC-537	4604	
L9	1st FM IF	1Ω*	.8Ω					
L10	1st AM IF	18Ω■	18Ω					
L11	Fil. Choke	0Ω			19-1001	BC-537	4604	
L12	RF Choke	3Ω			19-1003		4608	3.3Microhenries; IRC part no. CLA
L13	2nd FM IF	1.1Ω	1.1Ω		16-3487	FM-251	1463	
L14	2nd AM IF	18Ω	18Ω		16-6758	BC-353	12-C2	
L15	10KC Filter	1750Ω			15-7520		EL-58	1 Henry
L16	Fil. Choke	0Ω			19-1001	BC-537	4604	
L17	3rd FM IF	1.1Ω	1.2Ω		16-3487	FM-251	1463	
L18	FM Limiter	.3Ω						
L19	Fil. Choke	0Ω			19-1001	BC-537	4604	
L20	Discriminator	.7Ω	1ΩCT		17-3484	FM-250	1464	

♦ Tapped at .9Ω.
* Tapped at .5Ω.
■ Tapped at 8.5Ω.
▲ Enlarge chassis hole and drill new mounting holes.
▲ Leads sufficient mounting support.
† Drill mounting hole.

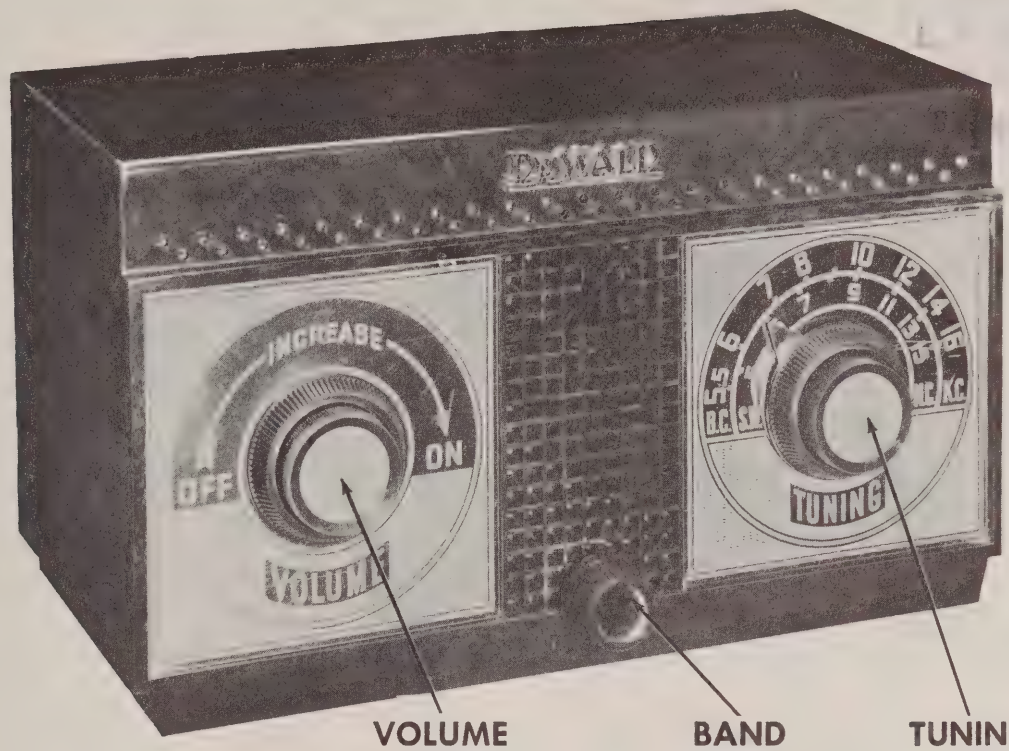
MISCELLANEOUS

ITEM No.	PART NAME	BELL SOUND PART No.	NOTES
M1	Dial Light		#44, Bayonet
M2	Dial Light		#44, Bayonet
M3	Tuning Cap.	17S007	28-420MMF, 22-420MMF, 22-195MMF
M4	Switch		AM-FM
A10	Trimmer Cap.	17X205	10KC Filter



DIAL CORD STRINGING

DEWALD
MODEL H-537



VOLUME CONTROL ON-OFF SWITCH

BAND SELECTOR SWITCH

TUNING

DEWALD
MODEL H-537

TRADE NAME	Dewald Model H-537
MANUFACTURER	Dewald Radio Mfg. Co., 35-15 37th. Ave., Long Island City, N.Y.
TYPE SET	AC-DC Operated 2 Band AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC-DC — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC-1680KC — SHORT WAVE 4.7MC-16.8MC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MMF	High side to antenna lead extending from rear of chassis. Low side thru .1MFD to chassis.	455KC (400∿Mod)	BC (CCW)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	16.8MC	SW	"	"	A5	"
3.	"	"	15MC	"	Tune to 15MC signal	"	A6	"
4.	"	"	1680KC	BC	Tuning gang fully open	"	A7	"
5.	"	"	600KC	"	Tune to 600KC signal	"	A8	Adjust for maximum output while rocking tuning gang.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

DEWALD MODEL H-537

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		DEWALD PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7CK	
V3	Det.-AVC-AF Amp.	12AT6	12AT6	7BT	12AV6 used as an alternate
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	DEWALD PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	30	150	E-200	PRS150/30-30		BBRD3315		TCD47	TVA-2434	
B	30	150								
C2	.05	200		P288-05	DF-503	CUB2S5		PT415	2TM-S5	
C3	100			SH00N750	TCN-100		N750L-101	NT-531	5TCU-T1	
C4	4700									
C5	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C6A	220									
B	5000			♦PA-113-2	♦PC-151	♦116TM2	♦1408-02		♦DT-2	
C	5000									
D }	250									
E }										
C7	.01	400		P488-01	D6-103	CUB4S1	GP2-333-103	PT411	4TM-S1	
C8	.05	400		P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C9	.1	400		P488-1	DF-104	CUB4P1		PT401	4TM-P1	

♦ Items C6A, C6B, C6C, C6D, C6E, R5A, R5B, and R5C are combined in one unit. When replacing items separately, C6D and C6E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	DEWALD PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	V-301	Q13-133	A47-500K-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	Not Req.	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	DEWALD PART No.	IRC PART No.	
R2	22KΩ	½		BTS-22K	
R3	100Ω	½		BTS-100	
R4	2.2Meg	½		BTS-2.2Meg	
R5A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	♦	BTS-470K	
C	470KΩ	½		BTS-470K	

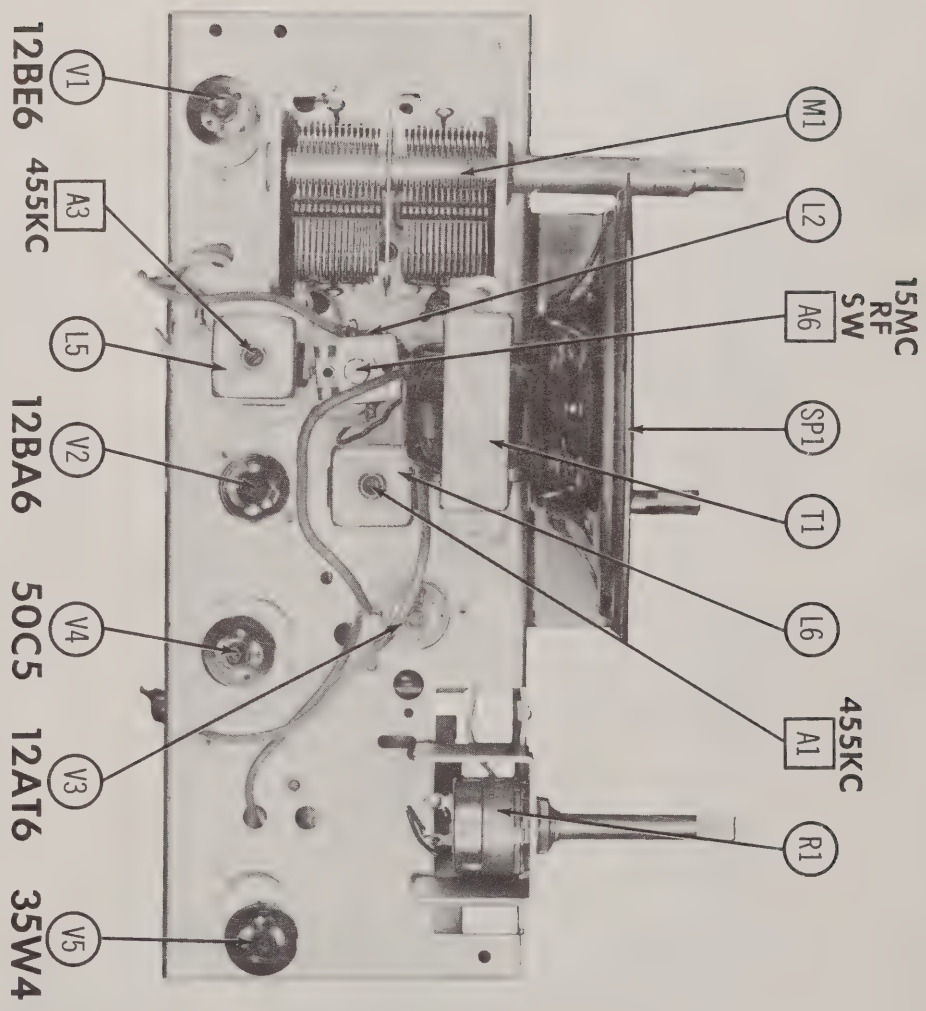
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	DEWALD PART No.	IRC PART No.	
R6	150Ω	½		BTS-150	
R7	1500Ω	1		BTA-1500	
R8	15Ω	½		BTS-15	

♦ Items R5A, R5B, R5C, C6A, C6B, C6C, C6D and C6E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	DEWALD PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.3KΩ	3.4Ω		A-3876	A-2928	S-1X	Z1001	24S50	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	DEWALD PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.4Ω		ST-113 Mod. P4-X①	4A07 ①	① Cut notch for tuning shaft

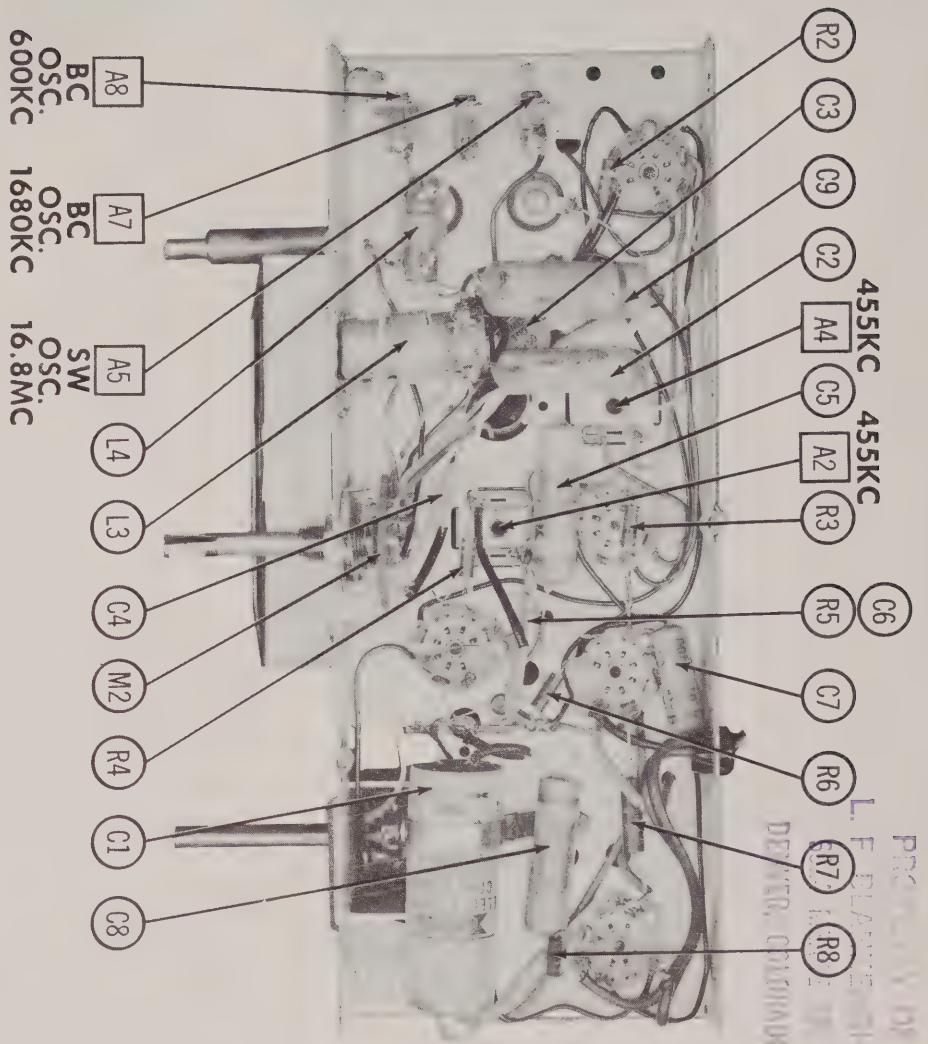
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	DEWALD PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	.1Ω	2.9Ω	1147C-3				Includes cabinet back
L2	SW Ant.Coil	.2Ω	.1Ω	O-103	14-1044			
L3	SW Osc.Coil	0Ω	.1Ω	O-102		BC-394		
L4	BC Osc.Coil	.3Ω	3.1Ω	O-101	14-1074		70-OSC	
L5	Input IF	25Ω	25Ω	1091C-7	16-6758	BC-352	12-C1	
L6	Output IF	25Ω	25Ω	1091C-7	16-6758	BC-353	12-C2	

MISCELLANEOUS

ITEM No.	PART NAME	DEWALD PART No.	NOTES
M1	Tuning Cap.	2072-2	2 Gang (12-465MMF, 9-465MMF)
M2	Switch	8017C-8	Band Selector (3 Pole - 2 Position)
	Trimmer Cap.	2074-2	Bank of 3 (2 trimmers and 1 padder) - SW Osc. Trimmer, BC Osc. Trimmer, BC Osc. padder.
	Trimmer Cap.	4065	SW Ant. Trimmer
	Cabinet	4212B-2	
	Knob	4241-1	On-off-volume
	Knob	4241-2	Tuning
	Knob	4243	Band Selector

CHASSIS—BOTTOM VIEW



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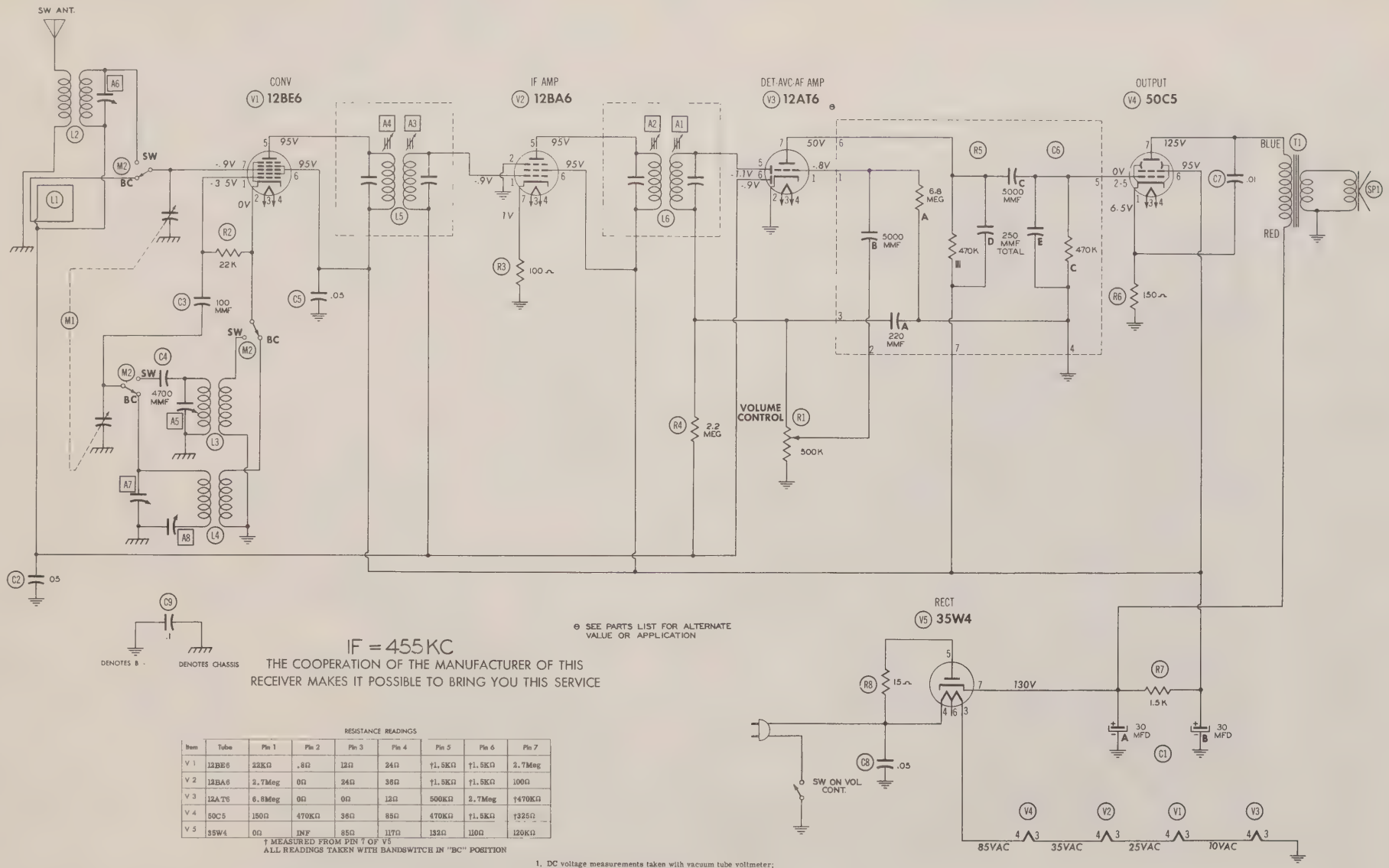
DENVER, COLORADO

DEWALD
MODEL H-537



IF = 455 KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.8Ω	12Ω	24Ω	†1.5KΩ	†1.5KΩ	2.7Meg
V 2	12BA6	2.7Meg	0Ω	24Ω	36Ω	†1.5KΩ	†1.5KΩ	100Ω
V 3	12AT6	6.8Meg	0Ω	0Ω	12Ω	500KΩ	2.7Meg	†470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	85Ω	470KΩ	†1.5KΩ	†325Ω
V 5	35W4	0Ω	INF	85Ω	117Ω	132Ω	110Ω	120KΩ

† MEASURED FROM PIN 7 OF V5
ALL READINGS TAKEN WITH BANDSWITCH IN "BC" POSITION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PRO
L. F.
DENVER

FREED-EISEMANN
MODEL 717, 750

FREED-EISEMANN
MODEL 717, 750

TRADE NAME	Freed-Eisemann Model 717 , 750		
MANUFACTURER	Freed-Electronics & Controls Corp., 200 Hudson St., New York 13, N.Y.		
TYPE SET	AC Operated AM-FM Superheterodyne Receiver For Custom Installation		
TUBES	Eleven		
POWER SUPPLY	110-120 Volts AC	RATING	.83 Amp. @ 117 Volts AC
TUNING RANGE - BROADCAST	535KC-1600KC	FREQ. MOD.	88MC-108MC

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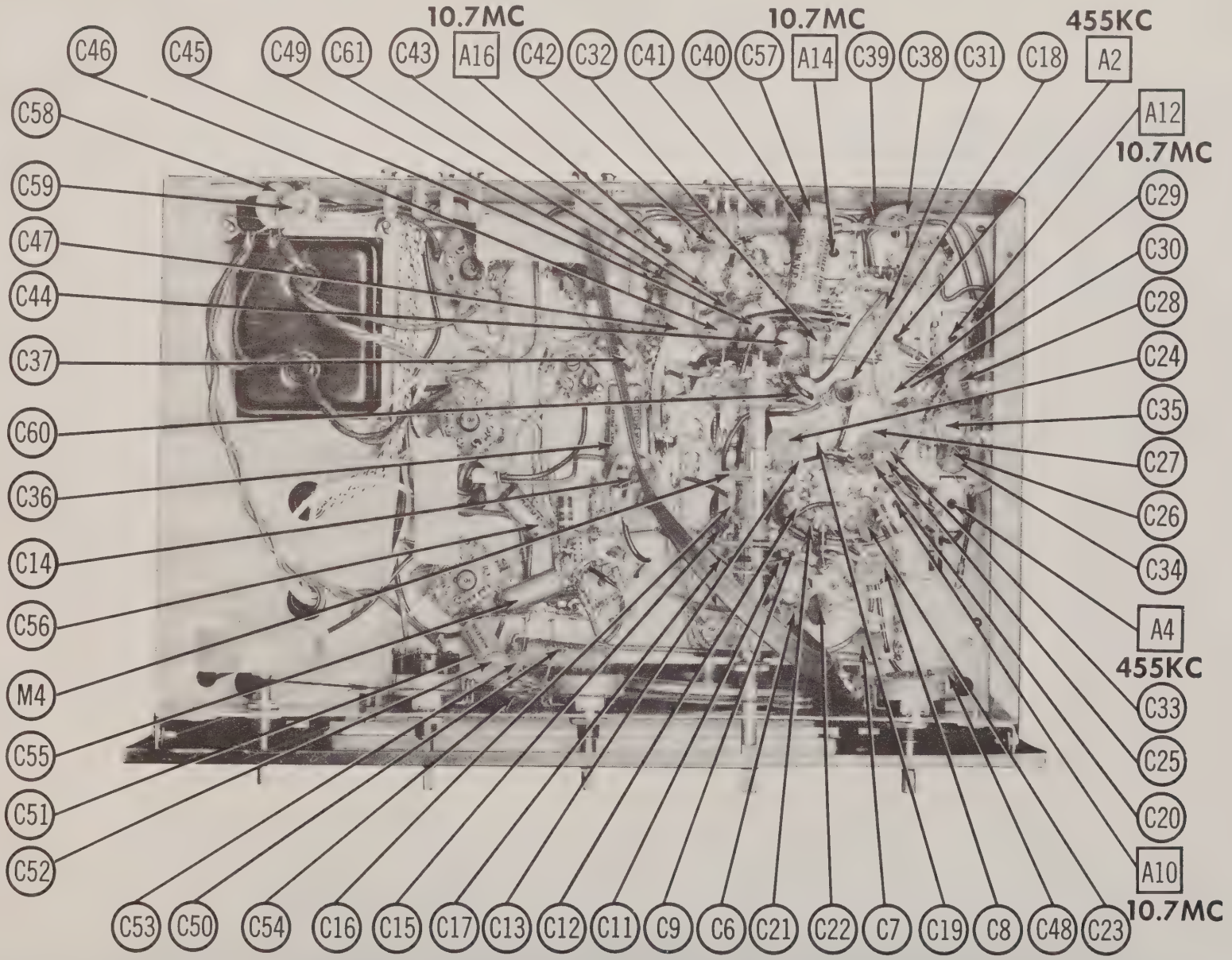
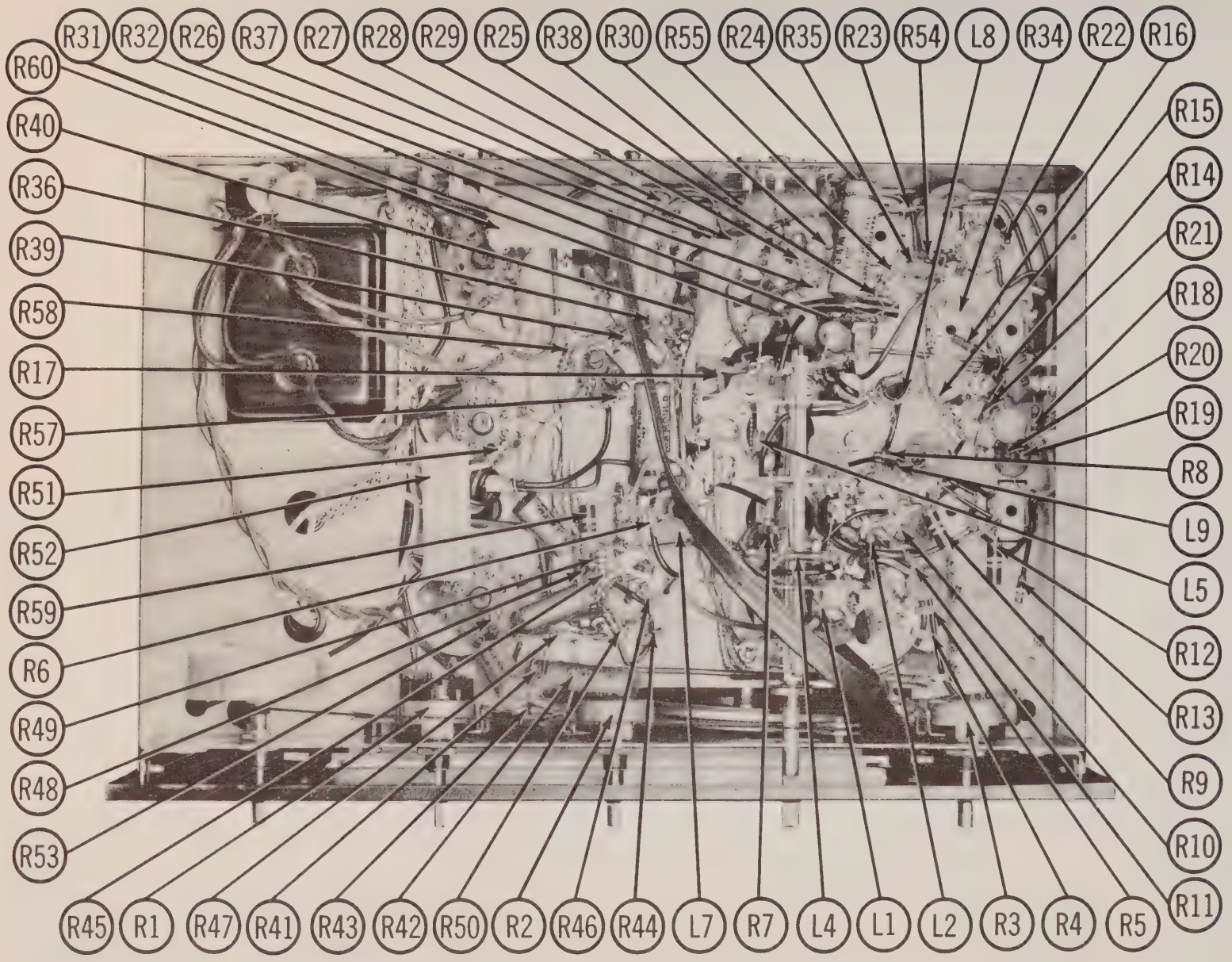
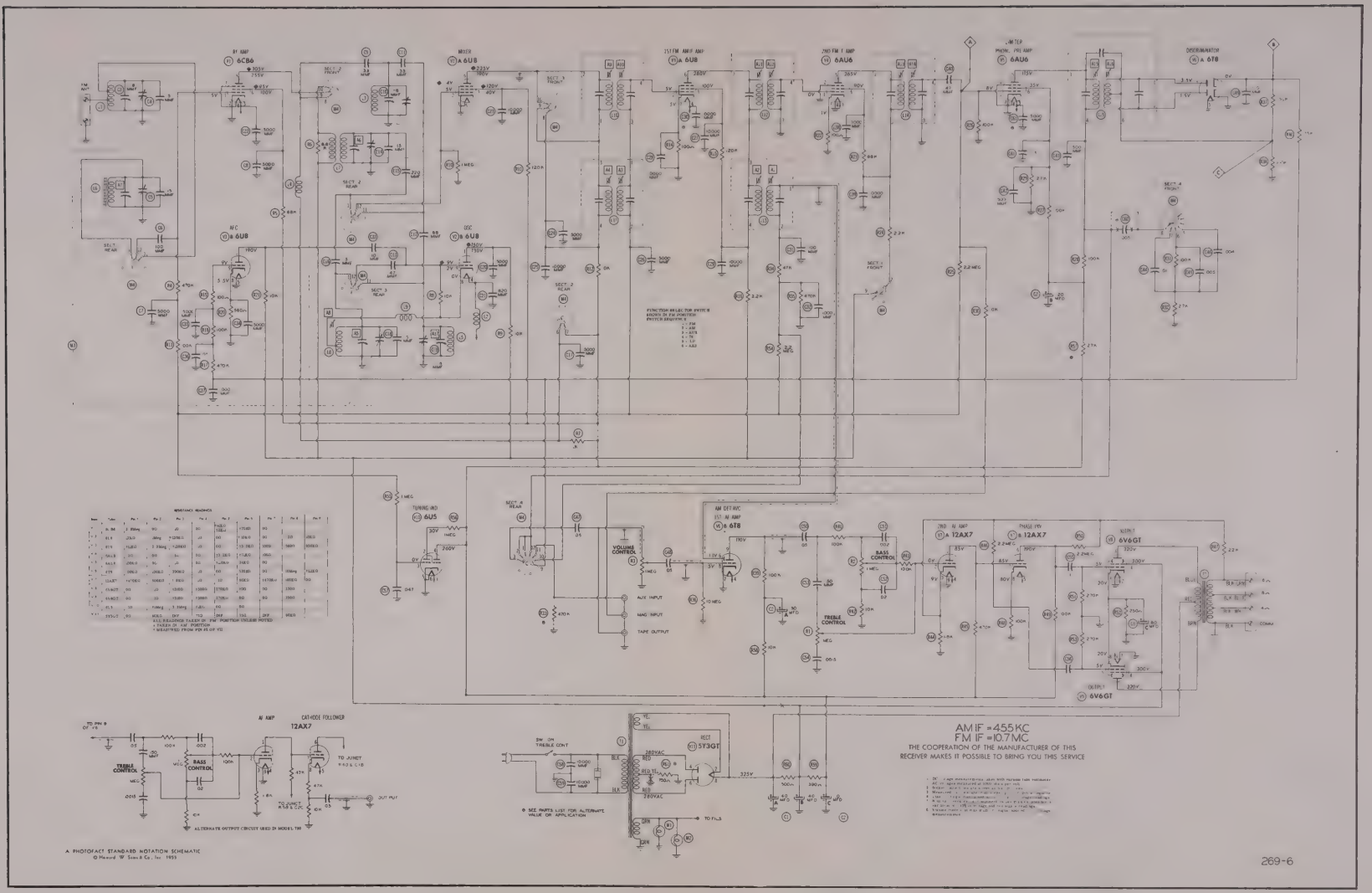


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

FREED-EISEMANN
MODEL 717


AM IF = 455 KC
FM IF = 10.7 MC
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
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269-6

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Short AFC (at point Ⓓ) to ground.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	455KC (400∿Mod)	AM	Point of non-interference	Across voice coil	A1, A2, A3, A4	Adjust for maximum deflection.
2.	220MMF	High side to AM ant. section of tuning gang. Low side to chassis.	1600KC	"	1600KC	"	A5	"
3.	"	"	1400KC	"	1400KC	"	A6, A7	"
4.	"	"	600KC	"	600KC	"	A8	Adjust for maximum deflection while rocking tuning gang. Repeat steps 3 & 4.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A9, A10, A11, A12, A13, A14	Adjust for maximum deflection.
6.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A15	"
7.	"	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A16	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to pin 2 (grid) of 6U8 (V2). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point Ⓐ. Low side to chassis.	A9, A10, A11, A12, A13, A14	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
6.	"	"	"	"	"	Vert. Amp. to point Ⓒ. Low side to chassis.	A15, A16	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A15 for maximum amplitude and straightness of crossover lines. Continue with step 8.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
8.	270Ω Carbon Resistor	High side thru 270Ω to FM antenna terminal. Low side to chassis.	106MC	FM	106MC	DC probe to point Ⓐ. Common to chassis.	A17	Adjust for maximum deflection.
9.	"	"	90MC	"	Tune to 90MC signal	"	L1, L3	Compress or expand L1 and L3 for maximum deflection.

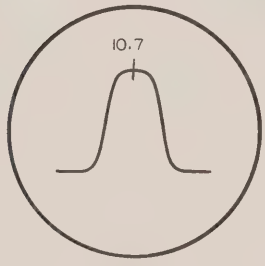


FIG. 1

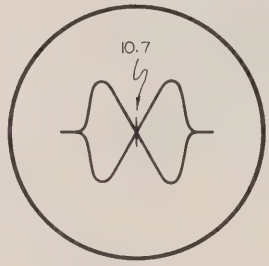


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

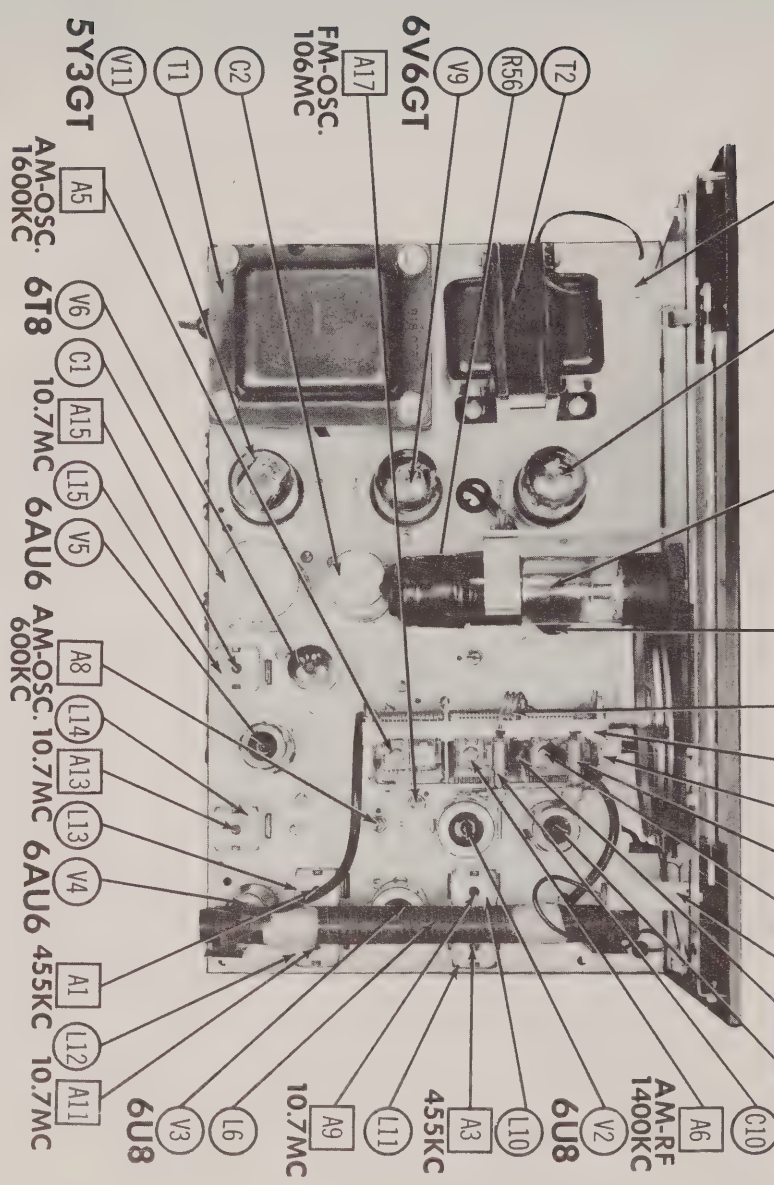
ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Freed-Eisemann PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6CB6	6CB6	7CM	
V2	Osc.-Mixer	6U8	6U8	9AE	
V3	1st. FM AM IF Amp. AFC	6U8	6U8	9AE	
V4	2nd. FM IF Amp.	6AU6	6AU6	7BK	
V5	Limiter-Phono Pre-Amp.	6AU6	6AU6	7BK	
V6	Disc.-AM Det.-AVC -1st. AF Amp.	6T8	6T8	9E	
V7	2nd. AF Amp.-Phase Inverter	12AX7	12AX7	9A	
V8	Output	6V6GT	6V6GT	7S	
V9	Output	6V6GT	6V6GT	7S	
V10	Tuning Indicator	6U5	6U5	6R	
V11	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Freed-Eisemann PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	450		AFH3-141		C109		FP375.5	TVL-3764	
B	■40	450								
C	▲80	50								
C2A	■30	350		AFH3-28		C022		FP330.7	TVL-2627 TVA-1604	
B	▲20	350								
C	10	350								
C3	1-8									
C4	5			SI5NP0	TCZ-5	TZ07	NP0K-050	ZT-555	5TCUB-V5	
C5	15			SI15	D6-150	TP11	GP1K-150	UC-5415	5GA-Q15	
C6	100	500		1469-101		22R5T1		MCE235	MS-31	Note 1
C7	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C8	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C9	33	500		1469-330		22R5Q33				
C10	1-8									
C11	33	500		1469-330		22R5Q33				
C12	.68									
C13	47	500		1469-470		22R5Q47				
C14	15			SI15	D6-150	TP11	GP1K-150	UC-5415	5GA-Q15	
C15	220	500		1469-221		22R5T22		MCE237		
C16	5			SI5NP0	TCZ-5	TZ07	NP0K-050	ZT-555	5TCUB-V5	
C17	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C18	15			SI15	D6-150	TP11	GP1K-150	UC-5415	5GA-Q15	
C19	1-8									
C20	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C21	820			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C22	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C23	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C24	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C25	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C26	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C27	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C28	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C29	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C30	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	Note 2
C31	100	500		1469-101		22R5T1		MCE235	MS-31	
C32	1000	500		1469-102		1R5D1		MCE255	MS-21	
C33	10			SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C34	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C35	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C36	.05	600		P688-05	DF-503	CUB6S5		PT615	6TM-S5	
C37	1000	500		1469-101		22R5T1		MCE235	MS-31	
C38	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C39	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C40	47	500		1469-470		22R5Q47				
C41	.03	200		P288-03	DF-303	PJ2S3		PT413	2TM-S3	
C42	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C43	1500			SI1500	D6-152	TP54	GP2L-152	UC-5215	5GA-T15	

CHASSIS—TOP VIEW



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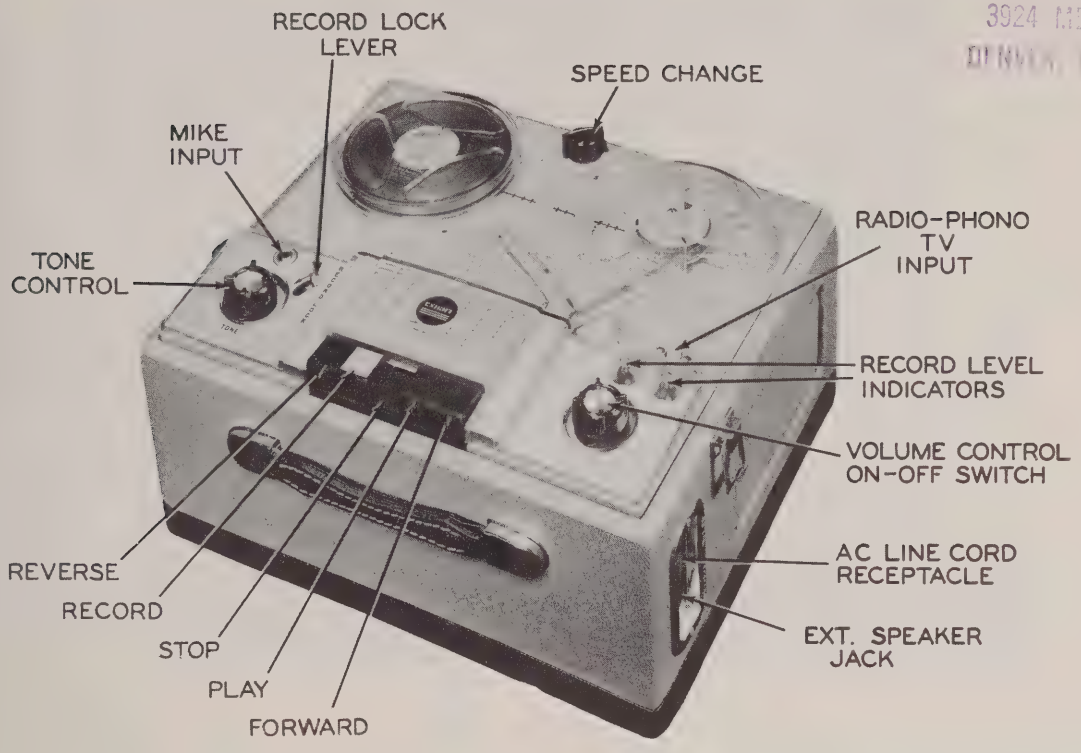

Figure 1

GENERAL INFORMATION

The Knight Model 96RX676 Tape Recorder features fingertip operation for Fast Forward, Playback, Stop, Record and Fast Reverse. This recorder is designed to record and play back two tracks of material on standard width recording tape, which doubles the playing time of a reel of tape with no loss of frequency response or quality. Recordings can be made from a radio, television receiver or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or an external speaker may be used through use of the Auxiliary Speaker Jack.

Model 96RX676 has two tape speeds, 7 1/2" and 3 3/4" per second. Using both tracks, the recording time is as follows:

SIZE	SPEED 3-3/4"	SPEED 7-1/2"
5" reel	1 hour	1/2 hour
7" reel	2 hours	1 hour

The Knight is designed to operate on 60 cycle, 115 volt, AC supply only.

CAUTION: Severe Damage Will Result If Connection Is Made To A Direct Current (DC) Line.

Allied Radio Corporation
100 N. Western Ave.
Chicago 80, Illinois

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KNIGHT
MODEL 96RX676

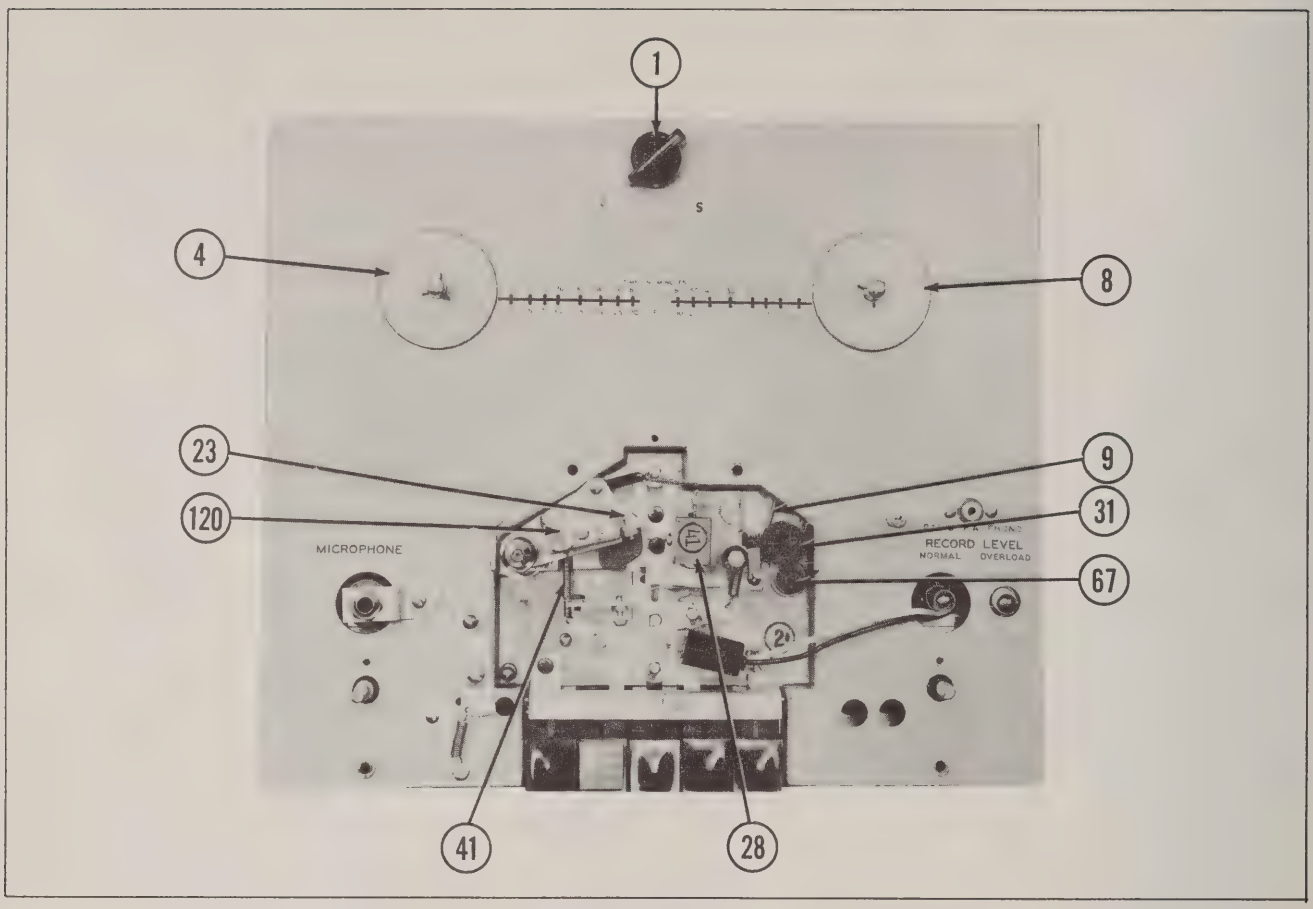

Figure 2

OPERATING INSTRUCTIONS

1. Plug the AC cord into a convenient wall receptacle of the proper rating.

Threading The Tape-

1. Place a reel of tape on the left spindle (4) and an empty reel on the right spindle (8) making sure the reel slots engage the reel pin on the spindles.

2. Unwind about 14" of the tape from the reel. Hold a section of the tape straight with both hands and insert the tape in the tape slot making sure the dull coated side of the tape faces the rear of the recorder.

NOTE: This recorder uses Type "A" wound tape, i.e. the dull magnetic coated side faces inward on the reel. If the tape to be used is Type "B" (coated side facing outward) place the reel on the left spindle so that the tape will lead-off in a clockwise direction. Bring the tape behind the rear cover (5) (not through the head slot) and thread it on to the right reel in the normal manner. Press the "Forward" button and allow the full reel of tape to wind on the empty reel. The dull side of the tape will now be facing inward on the reel.

3. Insert the free end of the tape through the hub of the right take-up reel and place a pencil firmly over the tape, forcing it into one of the three radial slots on the hub of the empty reel. Turn the reel several turns with the pencil in this position until the tape is secured to the reel and all slack is taken up between the reels.

To Record From Microphone-

1. Turn the On-Off Volume Control to the right until a click is heard and allow about thirty seconds for the unit to warm up. The pilot light located above the "Stop" button will glow when the unit is turned on.

2. Insert the microphone plug into the "Microphone Input Jack".

3. Turn the speed control knob (1) to the desired speed.

NOTE: Recordings made at a certain speed must be played back at that speed.

4. Move record lock lever (18) downward with the left hand. This releases the record safety lock which prevents accidental erasure.

5. Depress the "Record" button with the right hand (while holding the record lock lever (18) with the left hand) until it latches.

6. While talking into the microphone, adjust the "Volume" control until the "Normal" indicator flashes and no flashing occurs at the "Overload" indicator.

NOTE: Correct recording volume is very important. Too weak a signal, which does not cause the "Normal" indicator to flash, will result in

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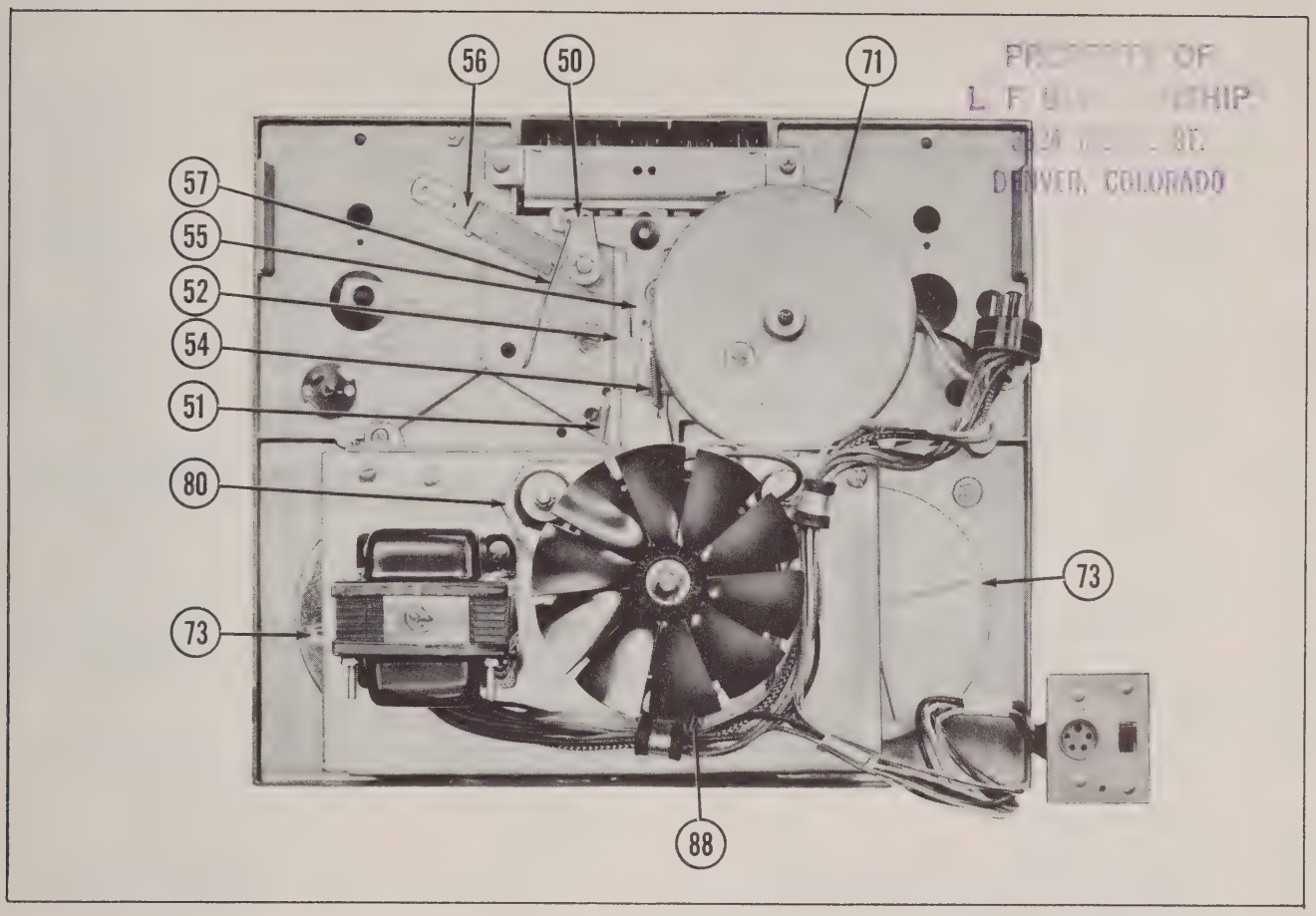


Figure 3

weak playback and high background noise. Too strong a signal, causing the "Overload" indicator to flash, will result in distortion during playback.

To Record From External Radio -

Recordings can be made from a radio by placing the microphone near the loudspeaker of the radio; however, this type of recording may not be satisfactory as other sounds may be picked up by the microphone which as a result will be recorded on the tape. A superior quality recording can be made by use of radio-phono attachment cord. Connect attachment cord as follows:

1. Connect the cord clips across the voice coil terminals on the radio speaker.

2. Insert the cord plug into the "Radio- P. A. - Phono Jack".

3. Proceed as described in "To Record From Microphone".

NOTE: Remove attachment cord after recording is completed.

To Record From Phonograph-

1. Connect the cord clips of the attachment cord to the pickup leads on the external phonograph.

2. Insert the attachment cord plug into the "Radio - P. A. - Phono" jack.

3. Proceed as described in "To Record From Microphone".

NOTE: Should a hum develope from the above connection, reverse the cord clips on the pick-up leads.

To Record From Television Receiver-

1. Connect attachment cord as described in "To Record From External Radio" and proceed with recording as described in "To Record From Microphone".

NOTE: This Recorders Tone Control does not operate during recording. When recording from radio or a television receiver set the radio or television tone control for maximum treble.

Dual Track Recording-

This recorder is designed so that 1/2 the tape width is recorded at a time; thereby resulting in two track recording. This two track operation is accomplished in the following manner:

1. After a reel of tape has been recorded, i. e. all of the tape wound on to the take-up reel, depress the "Stop" push button. This stops all movement of the tape.

2. Remove the reels from the recorder, turning the full reel over and placing it on the left spindle and the empty reel on the right spindle.

3. Properly thread the tape and proceed with the recording as in "To Record From Microphone".

4. After this track has been recorded the first track of recording is ready to be played without rewinding.

(a) Place the full reel of tape on the feed reel (left) spindle and the empty reel on the take-up (right) spindle.

(b) Thread the tape making sure the dull side of the tape faces the record head.

(c) Set the controls as described under "To Play A Recording".

To Play A Recording-

1. Thread the tape as described under "Threading The Tape".

2. Turn the On-Off Volume control on and allow thirty seconds for the tubes to warm up.

3. Depress the "Play" button until it is latched into position.

4. Adjust the Volume and Tone control to suit.

To Use An External Speaker-

Any size speaker of the permanent magnet type, having a 3 ohm voice coil, may be used by connecting a speaker extension cord across the voice coil of the speaker and then inserting the extension plug (same type as microphone plug) into the External Speaker Jack located on the right side of the cabinet. This automatically cuts out the self-contained speaker.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

2. For best results, cut tape at a slight diagonal, join ends together with splicing tape on the glossy side and trim off any excessive width.

Fast Forward And Fast Rewind-

High-speed forward or reverse wind can be obtained by pressing the desired button. These are used primarily in locating a desired portion of a recording in a few seconds.

CAUTION: The "Stop" button should always be depressed before changing functions or speeds. Always depress the "Stop" button when the recorder is not in use.

Erasing Recorded Material-

Erasing of recorded material takes place automatically when new material is recorded; therefore, no special step is necessary to erase recordings before new recordings are made. However, if a portion of a recording or an entire reel of tape is to be completely erased, do so as follows:

1. Properly thread the tape on the machine.

2. Turn the Volume Control knob clockwise until a click is heard. This turns the recorder on.

3. Press down on the Record button until it latches into position. The erasing of recorded material is now in process and may be stopped at any time by depressing the "Stop" button.

NOTE: Only one track of recorded material is erased at a time. To erase the second track, reverse the reels and repeat the above operation.

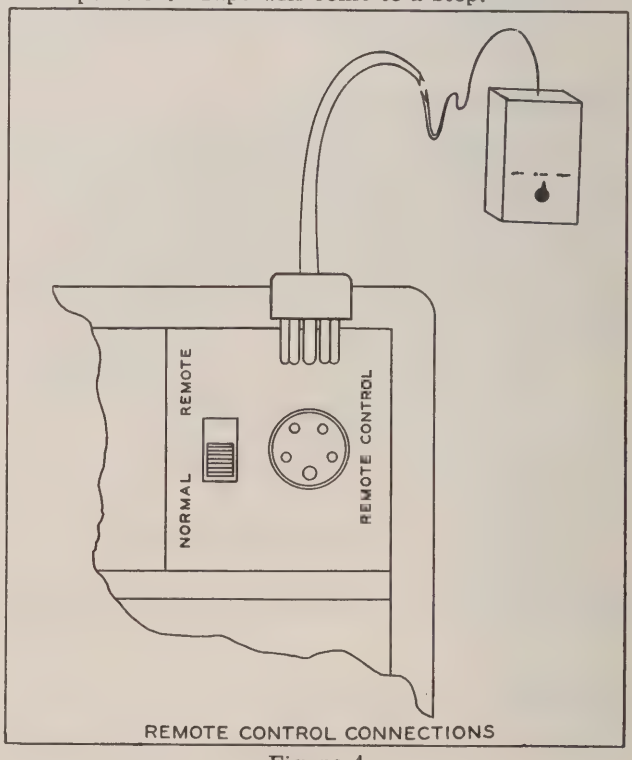
Remote Control Operation -

A socket and switch are provided to allow remote operation up to a distance of 18 feet, either recording or playback. This is accomplished by means of a remote control cable. Connect attachment cord as follows:

1. Insert remote control cable plug into remote socket. Be sure remote control switch on end of cable is in "Standby" position.

2. With control switch on the recorder in "Normal" position start the unit in the normal manner and set volume control to the proper level.

3. Place control switch on the set to "Remote" position. Tape will come to a stop.



REMOTE CONTROL CONNECTIONS

Figure 4

The recorder can now be operated (start and stop) by means of the remote cable switch. When

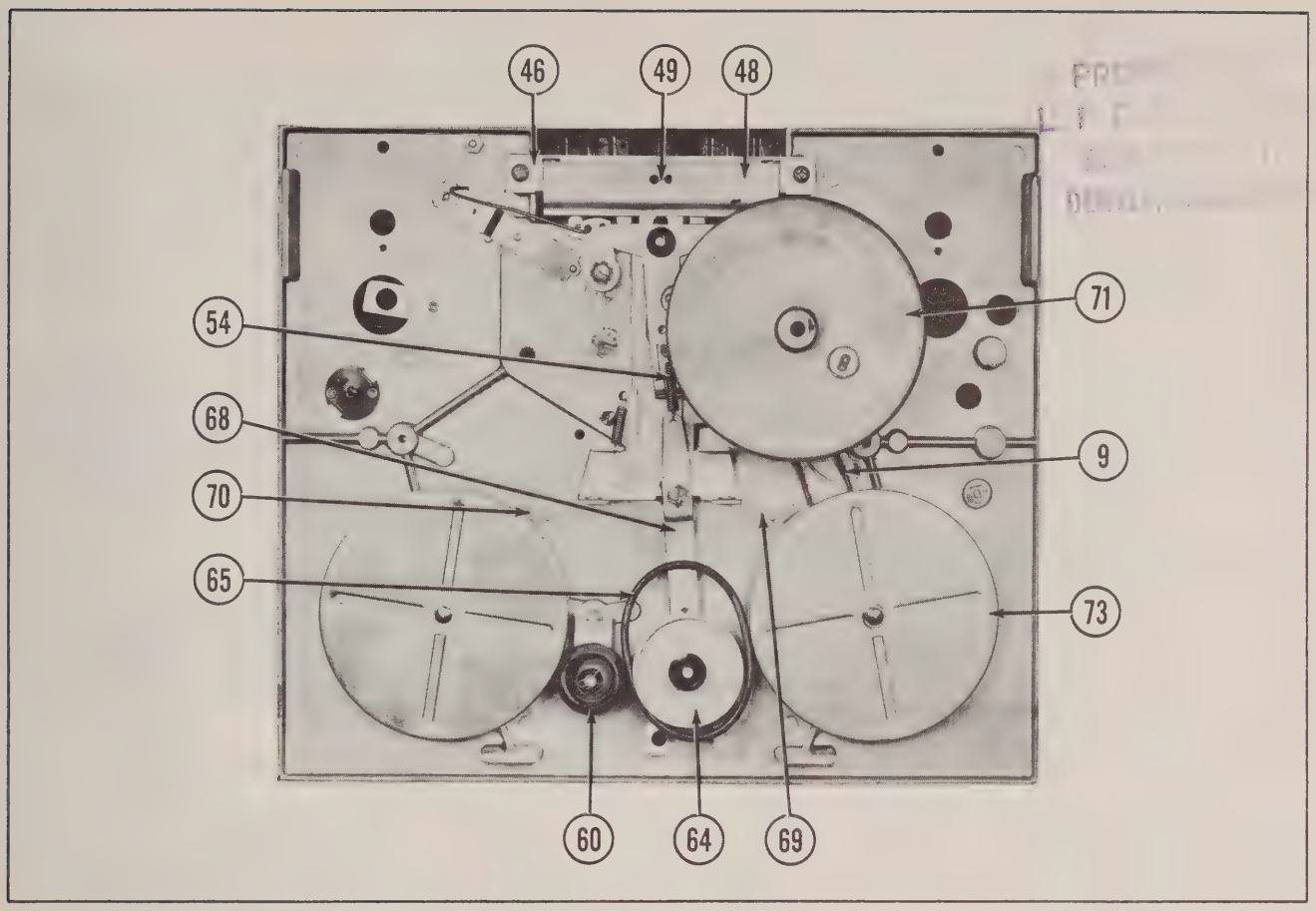


Figure 5

starting the recorder by means of the remote control, the switch should be rotated to the "Motor" position and then after a slight pause rotated to the "Record-Play" position. To stop recording or playback, rotate the control switch directly to "Standby" position, pausing slightly at the "Motor" position.

To Use Recorder As A Public Address System -

If this recorder is to be used as a public address system, plug in an extension speaker or speakers, if desired. Obtain a microphone connecting cord so that the microphone can be connected to the "Radio-P. A. - Phono" jack. Turn the recorder "On' and with the "Stop" button depressed set the "Tone" and "Volume" controls to the desired level.

ADJUSTMENTS

Disassembly Instructions-

1. Remove two Phillips head screws from rear of case.

2. Remove push-on type volume and tone control knobs.

3. Remove two screws located under volume and tone control knobs. Remove escutcheon.

4. Remove two hex head screws located under escutcheon.

5. Lift unit out of case, removing leads from speaker before removing unit completely.

Record-Play Head Adjustment (See Exploded View)-

To adjust the record-play head (28) for maximum frequency response, make the following adjustment:

1. Remove the rear cover escutcheon (5).

2. Properly thread an alignment tape or a good recorded tape on the machine.

3. Set the controls as described under "To Play A Recording".

Grip the vertical portion of the record head mounting bracket with a pair of long-nosed pliers. Rock the mounting bracket and record head from side to side slightly until the maximum high frequencies are obtained. Bend the bracket with the pliers to obtain a permanent set at this position.

4. Replace the rear cover escutcheon (5).

Pressure Pad Adjustment (See Exploded View)-

1. Remove the front and rear esctucheons (5 and 11).

2. Depress the "Play" button. Do not turn the recorder on.

3. Use a pencil type postal scale and check the amount of pressure necessary to just pull the pad away from the tape. The test should be made on the

end of the pressure pad mounting spring (37). Adjust the pressure pad for 1 3/4 oz. ± 1/4 oz. pressure.

(a) The record-head pressure pad is adjusted by the locked adjustment screw (44).

(b) The guide post pressure pad (43) is adjusted by bending the pressure pad spring. It must be adjusted for minimum pressure against the tape.

4. After the adjustments are made depress the "Stop" button and replace the trim covers.

Erase Head Adjustment-

1. With tape properly threaded, turn recorder on and depress the Record button. Allow tape to run for a few seconds then turn recorder off, but leave Record button depressed.

2. With the trim covers removed check the erase head (120), see Figure 2, to see if it is parallel with the tape,

3. Check to see if the top edge of the tape coincides with the top end of the diagonal slot in the erase head (junction of long diagonal slot and short vertical slot). To adjust level of tape, loosen lock nut (20), see Figure 6, and rotate tape guide post (21) to move tape up or down. Tighten lock nut (20).

4. After this adjustment has been made, check to see if the tape moves forward approximately 1/64" when the "Record" button is depressed, if not, loosen the forward adjustment screw (23) and turn the screw in or out as required to obtain this 1/64" adjustment. Tighten the lock nut.

5. Replace the trim covers.

Brake Shoe Adjustment (See Figure 5)-

1. In order to adjust the brake shoes, the complete mechanism must be removed from the carrying case and the speaker disconnected.

2. With all push buttons in the up position the brake shoes (70) should clear the drums by approximately 1/8".

3. Depress the "Stop" pushbutton while observing the brake shoes. Both brake shoes must contact the drums at the same time and with equal pressure.

4. The adjustment is accomplished by bending the spring arm (69).

Adjustment For Slow Take-Up Reel-

There are some instances where the spring drive belt (9), see Figure 5, stretches after a period of time. In this case, the belt should be removed and shortened.

1. Clip off 3 to 5 turns of the spring belt.

NOTE: The spring belt is made so that one end will twist into the tip of the other end; therefore, clip the turns off the large end of the belt.

2. Twist the ends together and replace the belt.

Bias Adjustment-

Turn the recorder on and depress the "Record" button; use no tape. To determine if the bias is within satisfactory limits without dismantling the unit, merely connect a VTVM from the top lug of the recording head to the chassis. If 75 to 100 volts are present, no adjustment is necessary.

If the readings are outside of this range, proceed as follows:

1. Try a new 5879.

2. If still not within range, remove the chassis shield and connect a low capacity VTVM from Pin 1 of the 6AQ5 to the chassis and adjust trimmer M4 (see Figure 8) to obtain a reading of 2.25 volts. This provides the optimum in performance.

Neon Record Level Indicators-

The neon record indicator firing level adjustment is only required if a neon bulb is replaced. The two neon record level indicators are adjusted for correct firing level by means of two trimmer capacitors, one for each indicator.

To adjust indicators proceed as follows:

1. Turn recorder on and depress "Record" button.

2. Connect a short jumper lead across the bias oscillator coil (L1), (short out the coil to disable the oscillator).

3. Connect an audio oscillator, set at 1000 cycles, into the microphone input jack. Output of audio oscillator should be approximately .01 volts. (A 1 volt output may be used with a 100 to 1 reduction pad of resistors inserted between the audio oscillator and the microphone jack.)

4. Connect probe of low capacity type AC VTVM to junction of 2 - 330KΩ resistors, R22 and R23, (mounted on terminal strip near volume control).

5. Adjust volume control to obtain a reading of 36 volts on VTVM and leave control set and VTVM connected.

6. Disconnect shorting jumper from across bias oscillator coil.

7. Adjust "Normal" indicator trimmer (M5A) fully clockwise and then turn slowly counterclockwise so that upon loosening the trimmer the "Normal" neon bulb barely lights. This adjustment must be made loosening the trimmer.

8. Short out bias oscillator coil.

9. Increase volume control to obtain a reading of 88 volts on the VTVM.

10. Remove short from bias oscillator coil.

11. Adjust "Overload" indicator trimmer (M5B) as described in step "7", for just barely lighting the "Overload" indicator bulb.

DENVER, COLORADO

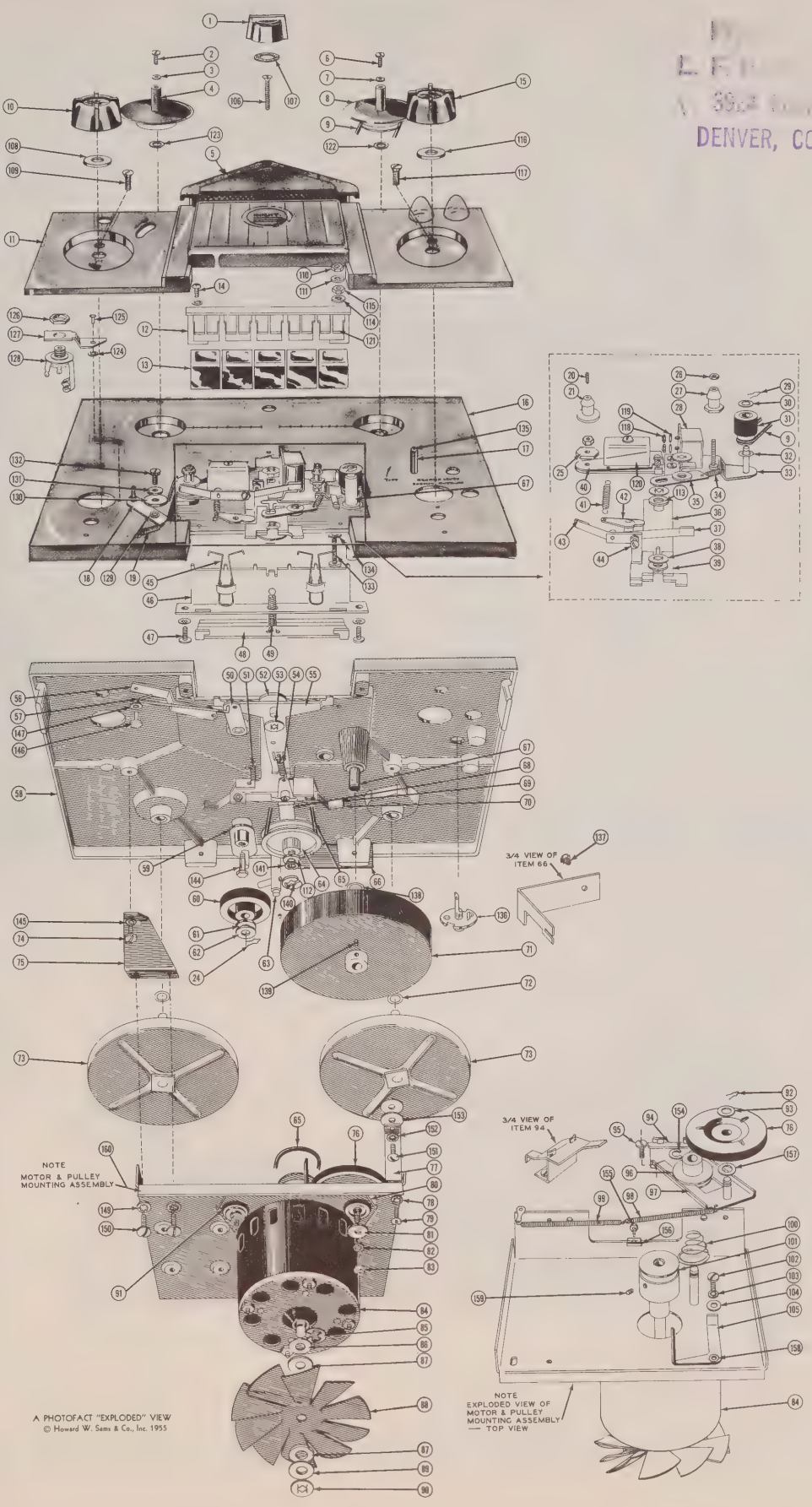

3/4 VIEW OF ITEM 66
3/4 VIEW OF ITEM 94
NOTE
MOTOR & PULLEY MOUNTING ASSEMBLY
NOTE
EXPLODED VIEW OF MOTOR & PULLEY MOUNTING ASSEMBLY — TOP VIEW
A PHOTOFACT "EXPLODED" VIEW
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Figure 6

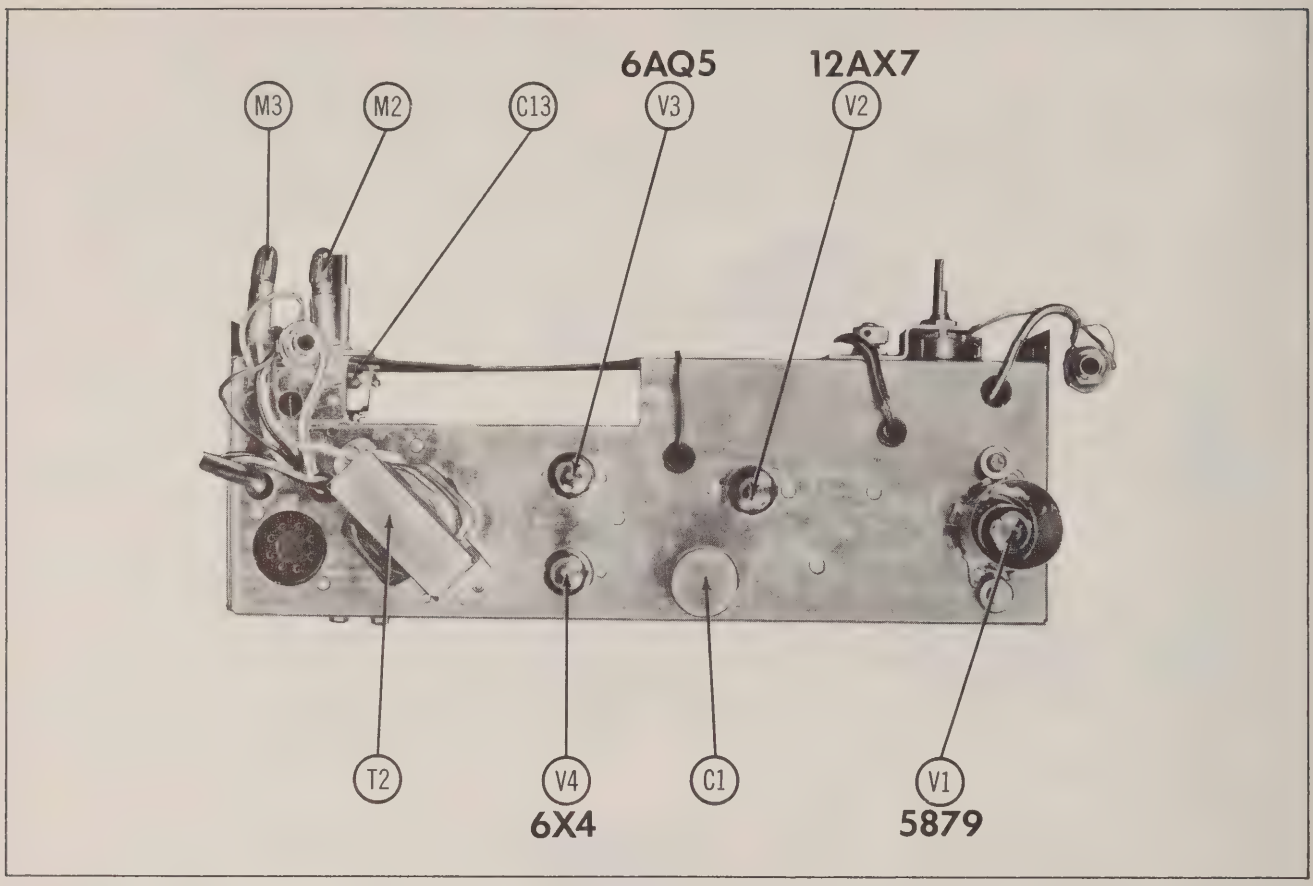


Figure 7

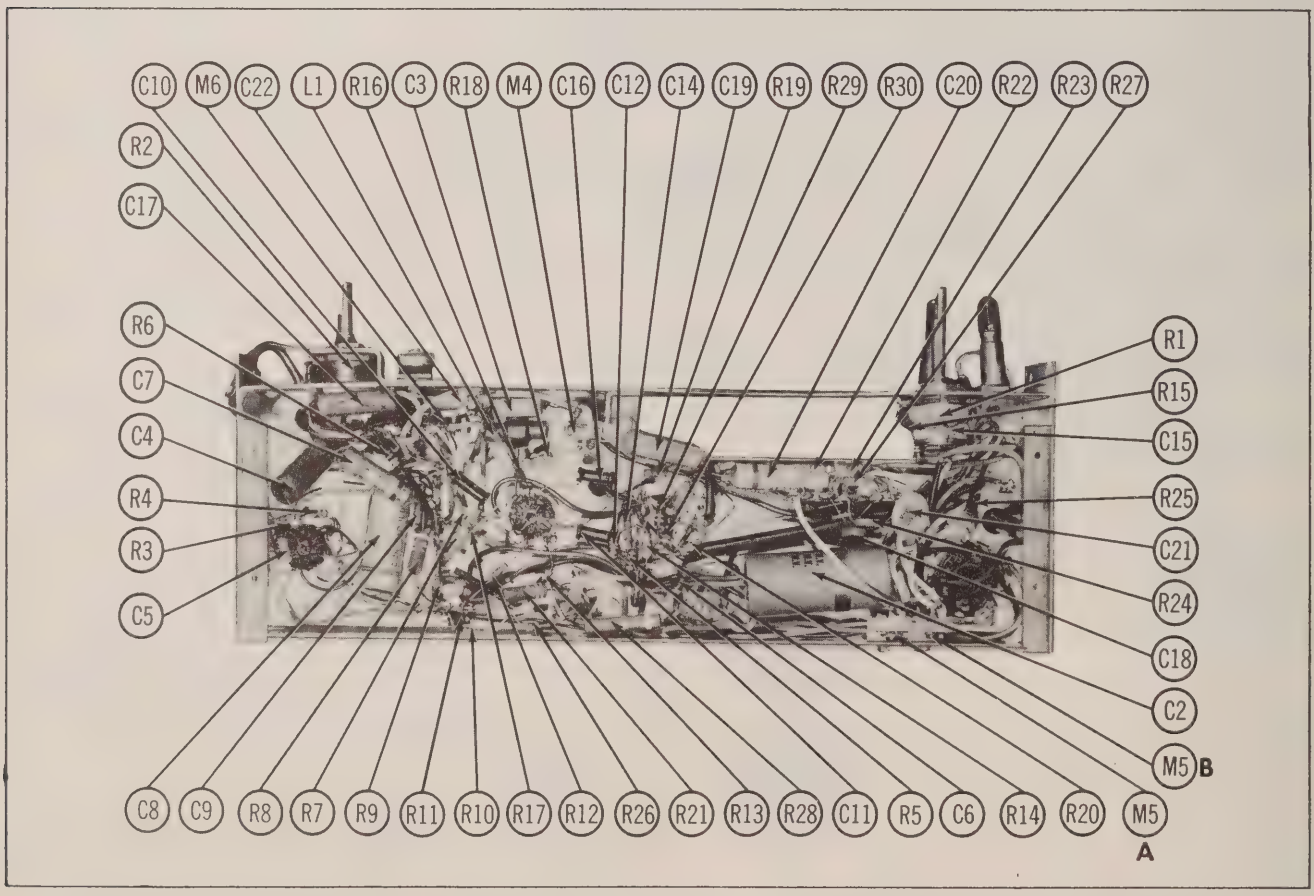
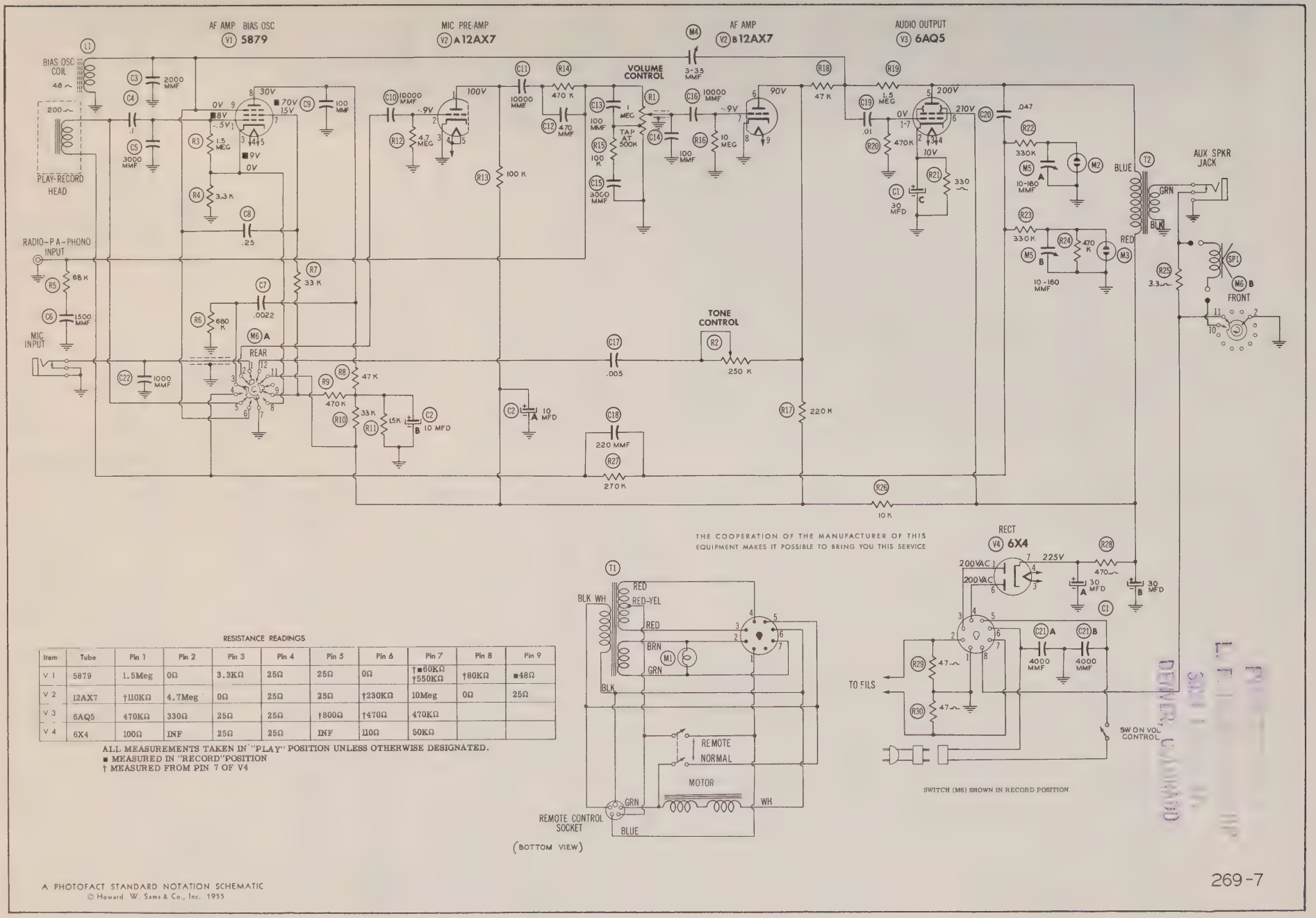


Figure 8



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	5879	1.5Meg	0Ω	3.3KΩ	25Ω	25Ω	0Ω	†■60KΩ †550KΩ	†80KΩ	■48Ω
V 2	12AX7	†110KΩ	4.7Meg	0Ω	25Ω	25Ω	†230KΩ	10Meg	0Ω	25Ω
V 3	6AQ5	470KΩ	330Ω	25Ω	25Ω	†800Ω	†470Ω	470KΩ		
V 4	6X4	100Ω	INF	25Ω	25Ω	INF	110Ω	50KΩ		

ALL MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED.
■ MEASURED IN "RECORD" POSITION
† MEASURED FROM PIN 7 OF V4

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269-7

KNIGHT
MODEL 98RX676

IMPORTANT: Do not readjust the recording bias oscillator adjustment after setting the indicator light adjustments.

TROUBLES

Push Buttons Fail To Latch Into Position-

1. Lock plate spring (49) loose or broken, resulting in the lock plate not being held against the hinge bracket (46). See Figure 5.

Fails To Erase-

1. Spring (41) loose or broken, resulting in the erase head (120) not being pulled forward to engage the tape. See Figure 2.

2. Erase head not aligned properly. See "Erase Head Adjustment".

No Fast Forward Or Reverse (See Figure 5)-

1. Idler lever tension spring (54) may be loose or broken; if so, the idler lever (68) will not be actuated. Replace spring (54).

2. Check idler drive belt (65), see Figure 6, to see if it is properly connected.

No Drive On Record Or Playback (See Exploded View)-

1. Idler tension spring (98 or 99) loose or broken, thereby not holding idler wheel (76) in engagement with motor pulley (101) and flywheel (71).

2. Idler slide plate (97) binding on the slide bushing (96), thus preventing the idler from moving forward.

Tape Fails To Wind On Reel During Record Or Playback-

1. Reel Drive Spring (9) loose or broken. See Figure 5.

Speed Variation Or "Wow" (See Exploded View)-

1. Check capstan (67), pinch roller (31), idler (76), motor pulley (101), and flywheel (71) for oil or foreign material. Clean these parts with a good cleaning fluid.

2. Check motor pulley (101) to see if it is secured to motor.

3. Check idler tension spring (98 or 99); see if it is holding the idler engaged with motor pulley and flywheel.

4. Idler slide plate (97) binding on the slide bushing (96), preventing idler wheel (76) from making positive contact with motor pulley and flyhweel.

Tape Overruns Or Spills When Stop Button Is Depressed During Fast Forward Or Rewind-

1. Brake shoes out of adjustment. See "Brake Shoe Adjustment".

2. Brake pads worn out. Replace pads.

Failure To Record-

1. Tape pressure pad not adjusted properly, resulting in the tape not being held against the recording head. See "Pressure Pad Adjustment".

2. Record head loose on its mounting. Adjust head and tighten into position as described under "Record-Play Head Adjustment".

3. Check the recording tape to see if the dull-coated side faces inward on the reel. If the dull side faces outward, a recording cannot be made. If this condition exists, wind the tape onto an empty reel, as described in "Threading The Tape".

CLEANING

The record head, capstan and pressure roller are subject to an accumulation of tape coating residue, which is worn off the tape as it passes these parts, Use a soft cloth and alcohol to clean the head surfaces, capstan and pressure roller.

CAUTION: Do not use a brush when cleaning the recording head as this could possibly mar the laminations.

LUBRICATION

All rotating parts are provided with generous-size oilite bearings, which are factory lubricated and require no further attention.

An occasional cleaning out of foreign matter under the plastic pushbutton cover is desirable, and a small drop of oil on the sliding lever members is advisable.

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1		5879, AF Amp., Bias Oscillator	C3		Cap., Mica, 2000mmf.
V2		12AX7, Mic. Pre-Amp., AF Amp	C4		Cap., Paper, .1mfd. @ 200V.
V3		6AQ5, Audio Output	C5		Cap., Ceramic, 3000mmf.
V4		6X4, Rectifier	C6		Cap., Ceramic, 1500mmf.
C1A	5.437	Elect. Cap., 30mfd. @ 250V.	C7		Cap., Paper, .002mfd. @ 600V.
C1B		Elect. Cap., 30mfd. @ 250V.	C8		Cap., Paper, .25mfd. @ 200V.
C1C		Elect. Cap., 30mfd. @ 25V.	C9		Cap., Ceramic, 100mmf.
C2A	5.444	Elect. Cap., 10mfd. @ 200V.	C10		Cap., Ceramic, 10,000mmf.
C2B		Elect. Cap., 10mfd. @ 200V.	C11		Cap., Ceramic, 10,000mmf.

PROPERTY OF

ELECTRICAL PARTS LIST - Con't.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
C12		Cap., Ceramic, 470mmf.	R19		Resistor, 1.5Meg., 1/2 W., 10%
C13		Cap., Ceramic, 100mmf.	R20		Resistor, 470KΩ, 1/2 W., 10%
C14		Cap., Ceramic, 100mmf.	R21		Resistor, 330Ω, 1 W., 10%
C15		Cap., Ceramic, 3000mmf.	R22		Resistor, 330KΩ, 1/2 W., 10%
C16		Cap., Ceramic, 10, 000mmf.	R23		Resistor, 330KΩ, 1/2 W., 10%
C17		Cap., Paper, .005mfd.@600V.	R24		Resistor, 470KΩ, 1/2 W., 10%
C18		Cap., Ceramic, 220mmf., ±10%	R25		Resistor, 3.3Ω, 1 W.
C19		Cap., Paper, .01mfd. @400V.	R26		Resistor, 10KΩ, 1/2 W., 10%
C20		Cap., Paper, .05mfd. @400V.	R27		Resistor, 220KΩ, 1/2 W., 10%
C21A		Cap. Disc. Dual, 4000mmf.	R28		Resistor, 470Ω, 2 W., 10%
C21B		Cap. Disc. Dual, 4000mmf.	R29		Resistor, 47Ω, 1/2 W., 10%
C22		Cap., Mica, 1000mmf.	R30		Resistor, 47Ω, 1/2 W., 10%
R1	8.227-2	Volume Cont. & Switch, 1Meg.	T1	9.263	Power Trans. & Plug Assy.
R2	8.231-1	Tone Cont., 250KΩ	T2	9.264	Output Transformer
R3		Resistor, 1.5Meg., 1/2 W., 10%	SP1	30.341-1	3.2 ohm PM Speaker
R4		Resistor, 3.3KΩ, 1/2 W., 10%	L1	17-3137-A	Bias Oscillator Coil
R5		Resistor, 68KΩ, 1/2 W., 10%	M1	45-2033	Pilot Lamp (TS-44)
R6		Resistor, 680KΩ, 1/2 W., 10%	M2	45-2036	Neon Lamp (NE51) Normal Indicator
R7		Resistor, 33KΩ, 1/2 W., 10%			
R8		Resistor, 47KΩ, 1 W., 10%	M3	45-2036	Neon Lamp (NE51) Overload Indicator
R9		Resistor, 470KΩ, 1/2 W., 10%			
R10		Resistor, 33KΩ, 1/2 W., 10%	M4		Trimmer, Bias Adj. (3-35mmf.)
R11		Resistor, 15KΩ, 1/2 W., 10%	M5A		Trimmer, Normal Indicator Adj. (10-160mmf.)
R12		Resistor, 4.7Meg., 1/2 W., 10%			
R13		Resistor, 100KΩ, 1/2 W., 10%	M5B		Trimmer, Overload Indicator Adj. (10-160mmf.)
R14		Resistor, 470KΩ, 1/2 W., 10%			
R15		Resistor, 100KΩ, 1/2 W., 10%	M6A		Play-Record Switch (Viewed from Rear)
R16		Resistor, 10Meg., 1/2 W.			
R17		Resistor, 220KΩ, 1/2 W., 10%	M6B		Play-Record Switch (Viewed from Front)
R18		Resistor, 47KΩ, 1/2 W., 10%			

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	13.252-2	Speed Shift Knob	29		Hairpin Clip
2		Screw, 6-32 x 1/4 BHMS	30	28.163	Varnished Impregnated Linen Washer
3		#6 Cantlink Washer			
4	13.261-4	Reel Pan For Feedreel	31	33.404	Pinch Roller
5	13.264	Rear Escutcheon	32		Linen Washer
6		Screw, 6-32 x 1/4 BHMS	33		Pinch Roller Plate Assembly
7		#6 Cantlink Washer	34		Pinch Roller Tension Spring
8	13.262-4	Reel Pan For Take-Up Reel	35		Playback Actuating Lever
9	31.351	Reel Drive Spring (Belt)	36		Playback Slide Plate Assembly
10	13.254-6	Tone Control Knob	37	35.764	Pressure Pad Spring Assembly
11	13.295	Front Escutcheon, Green	38		Push-On Stud Nut, 3/16 Stud.
12		Push Button Retainer Bracket	39		Record Slide Plate
13	13.258-4	Push Button, Green (5 Used)	40		Erase Head Plate Assembly
14		#6-32 x 3/16 BHMS St. Stat. Brz. Phillips	41		Erase Head Tension Spring
			42		Record Actuating Lever Assy.
15	13.254-6	Volume Control Knob	43	31.334	Felt Pad
16		Base Plate Assembly, Green	44		Screw (Spring Adjusting) #6-32 x 3/8 RHMS Stl.
17		Tape Guide Post			
18		Interlock Lever & Handle Assy.	45		Push Button Return Spring
19		Interlock Lever & Handle Assy. Return Spring	46		Hinge Bracket For Push Buttons
			47		Screw, 8-32 x 3/8 Phillips Rd.Hd.
20		6-32 Hex Nut	48		Locking Plate For Push Buttons
21	32.300	Tape Guide Post (Left)	49		Lock Plate Spring
22		Erase Head Adjustment Screw	50		Switch Lever Assembly
23		Erase Head Forward Adjustment	51		Brake Return Spring
24	33.409	Hairpin Clip	52	51.3233	Brake Slide Plate Assembly
25		Tape Guide Post Spacer	53		Push-on Stud Nut For 3/16" Stud.
26		6-32 Hex Nut	54		Idler Lever Tension Spring
27	32.252	Tape Guide (Right)	55		Shift Plate Assembly
28	36.156	Recording Head, Tape, (Shure Bros. TR16A Low Impedance)	56		Record Interlock Assembly
			57		Switch Arm Length

MECHANICAL PARTS LIST - Con't.

Ref. No.	Part No.	Description
58		(Bottom View Of Item 16)
59		Sub-Idler Plate Assembly
60	33.405	Sub-Idler Wheel
61		Felt Washer
62		Flat Washer, 7/16"
63		Speed Control Shaft Assembly
64	33.406	Idler Drive Sheave
65	28.162	Idler Drive Belt
66		Idler Steady Bracket. (Part Of Item 160)
67	32.259	Capstan Shaft
68		Idler Lever Assembly
69		Brake Spring
70	31.335	Brake Pad, Felt
71		Flywheel
72		Linen Washer
73	35.823	Brake Drum
74		Screw, 8-32 x 1/4 RHMS
75		Drive Mtg. Plate Bracket
76	33.408	Rubber Bonded Idler, 2 1/2" Dia.
77		Angle Bracket For Mounting Drive Assembly
78		#8 Int. Lockwasher, Stl. C. P.
79		Screw, 8-32 x 1/4 RHMS, Phillips
80	19.837	Motor Adaptor Plate
81		Washer (Flat), 3/4 OD x 3/16 ID x .050 Stl. C. P.
82		Lockwasher, Internal #8
83		Hex Nut, #8-32 x 5/16" Stl. C. P.
84	36.153	Motor, Round Type Fasco
85		Truarc Retaining "E" Ring
86		Washer, (Flat) 5/8 OD x .260 ID x .032 Stl. C. P.
87		Washer, Felt, 3/4 OD x 1/4 ID
88	19.887	Fan Blade
89		Washer, (Flat) 5/8 OD x .260 ID x .032 Stl. C. P.
90		Push-on Fastener (Presthole)
91	28.159	Shockmount, Lord, J-2927-1-2
92		Hair Pin Clip
93		Linen Washer
94		Speed Shift Lever
95		Screw, 6-32 x 3/16 BHMS Stl. Stat. Brz. Phillips
96		Idler Slide Bushing
97		Idler Slide Plate Assembly
98		Idler Spring (Tension)
99		Idler Spring (Tension)
100		Idler Lift Compression Spring
101	32.288	Motor Pulley
102		Screw, 8-32 x 1/4 RHMS Stl. C. P.
103		Internal Lockwasher, #8 Stl. C. P.
104		Flat Washer 5/8 OD x .260 ID x 1/32 Stl. C. P.
105		Idler Throw-out Lever
106		Screw, 6-32 x 1 OHMS Brass
107		Washer, Felt, 3/4 OD x 1/4 ID
108		Washer, Felt, 3/4 OD x 1/4 ID
109		Screw, 8-32 x 1 OHMS Phillips,
110		Nut, Steel, 6-32 C. P. 1/4 AF
111		Int. Lockwasher, #6 Stl. C. P.
112		Felt Washer
113		Flat Washer 1/2 OD x .205 ID x 1/32 Stl. C. P.
114		Int. Lockwasher, #6 Stl. C. P.
115		Nut, Steel, 6-32 C. P. 1/4 AF
116		Washer, Felt, 3/4 OD x 1/4 ID
117		Screw, 8-32 x 1 OHMS Phillips, Stl. Stat. Brz.
118		Hex. Nut, 2-56 x 3/16 Brass C.P.
119		Int. Lockwasher, #3 Phos. Brz. N. P.
120	35.756	Permanent Magnet Type Erase Head Assembly
121		Push Button Assembly
122		Linen Washer
123		Linen Washer
124		Int. Lockwasher, #8 Stl. C. P.
125		Drill Rivet, 1/4 x .122 x 7/32 Oval Brass N. P.
126		Hex Nut, 8-32 x 11/32
127		Bracket (Input Jack)
128		Midget Jack
129		Shoulder Washer
130		Flat Washer, 7/16 x 1/8 x .050 Stl. C. P.
131		Int. Lockwasher Stl. C. P.
132		Screw, 8-32 x 5/16 RHMS Stl. C.P.
133		Screw, 6-32 x 1/2 BHMS
134		Int. Lockwasher Stl. C. P.
135		Screw, #6-32 x 1 RHMS Phillips Stl. N. P.
136		Midget Jack
137		4-40 x 1/4 Hex. Nut
138		Linen Washer
139		8-32 x 3/16 Allen Hd. Set Screw
140		Truarc Retaining "E" Ring
141		Washer, Flat, Blued Steel 7/16"
144		Hex. Hd. Shoulder Screw
145		Int. Lockwasher, #8, Stl. C. P.
146		Drilled Rivet, 1/4 x .122 x 7/32, Oval Brass N. P.
147		Flat Washer, 7/16 x 1/8 x .050 Stl. C. P.
149		Int. Lockwasher, Stl. C. P.
150		Screw, 8-32 x 1/4 RHMS Stl. C.P.
151		Screw, 8-32 x 1/4 RHMS Stl. C.P.
152		Int. Lockwasher, Stl. C. P.
153		1/2 x 3/16 x 3/64 Flat Washer
154		"C" Washer, Stl. C. P.
155		#4 x 3/16 P. K. Screw Hex. Hd.
156		Spring Clip
157		Linen Washer
158		Shouldered Washer, Stl., C. P.
159		#8-32 x 1/4 Bristol Hd. Cup Point Set Screw Stl., C. P.
160		Drive Mounting Plate Assembly

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DENVER, COLORADO

MASCO
MODELS CAM-5, CAM-10

MASCO
MODELS CAM-5, CAM-10

TRADE NAME	Masco Model CAM-5, CAM-10
MANUFACTURER	Mark Simpson Mfg. Co., Inc., 32-28 49th. St., Long Island City 3, N.Y.
TYPE SET	AC Operated Intercommunication System Master Units
TUBES (Four)	Types 6C4 Pre-Amp., 12AX7 AF Amp., 6V6GT Output, 6X5GT Rectifier
POWER SUPPLY	110-120 Volts AC RATING .25 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

MASCO MODEL CAM-5

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: MASCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Pre-Amplifier	6C4	6C4	6BG	
V2	AF Amplifier	12AX7	12AX7	9A	
V3	Output	6V6GT	6V6GT	7S	
V4	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MASCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	20	350								
B	20	350								
C	10	350								
D	10	350								
C2	10	50		PRS50/10		BR105		TC32	TVA-1304	
C3	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C4	470			BPD-471	DD-471	K060	831-471	UC-5347	5GA-T47	
C5	470			BPD-471	DD-471	K060	831-471	UC-5347	5GA-T47	
C6	470			BPD-471	DD-471	K060	831-471	UC-5347	5GA-T47	
C7	.005	600		P688-005	DF-503	CUB6D5	GP2-333-502	PT625	6TM-D5	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MASCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500KΩ	½		Q13-133	A47-500K-Z	AB-60	U-48	Volume
B	Shaft			Not Req.	RS-2	AK-9	Not Req.	Attach to R1A
C	Switch			76-1	SWE-12	KB-1	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MASCO PART No.	IRC PART No.	NOTES
R2	33Ω	1			
R3	33Ω	1			
R4	270KΩ	1		BTA-270K	
R5	100KΩ	½		BTS-100K	
R6	470KΩ	½		BTS-470K	
R7	2700Ω	½		BTS-2700	
R8	470KΩ	1		BTA-470K	

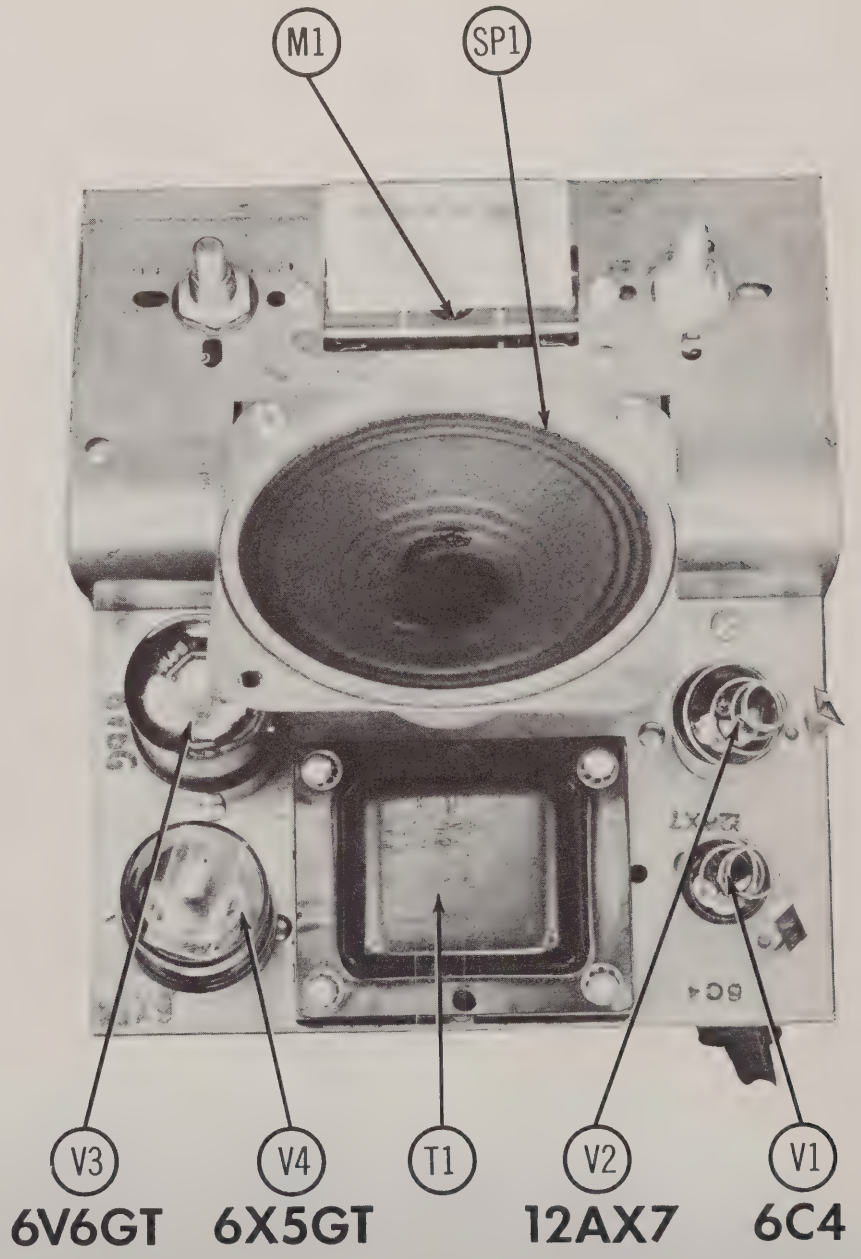
ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MASCO PART No.	IRC PART No.	NOTES
R9	2.7Meg	½		BTS-2.7Meg	
R10	4700Ω	½		BTS-4700	
R11	470KΩ	½		BTS-470K	
R12	15KΩ	½		BTS-15K	
R13	270Ω	1		BTA-270	
R14	2700Ω	1		BTA-2700	
R15	270Ω	2			

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: MASCO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @.25A	474VCT .046A	6.3VAC @1.55A			P-6348 ①		R-4B		24R00 ①

① Drill new mounting holes.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MASCO PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T2	5.1KΩ	45Ω							

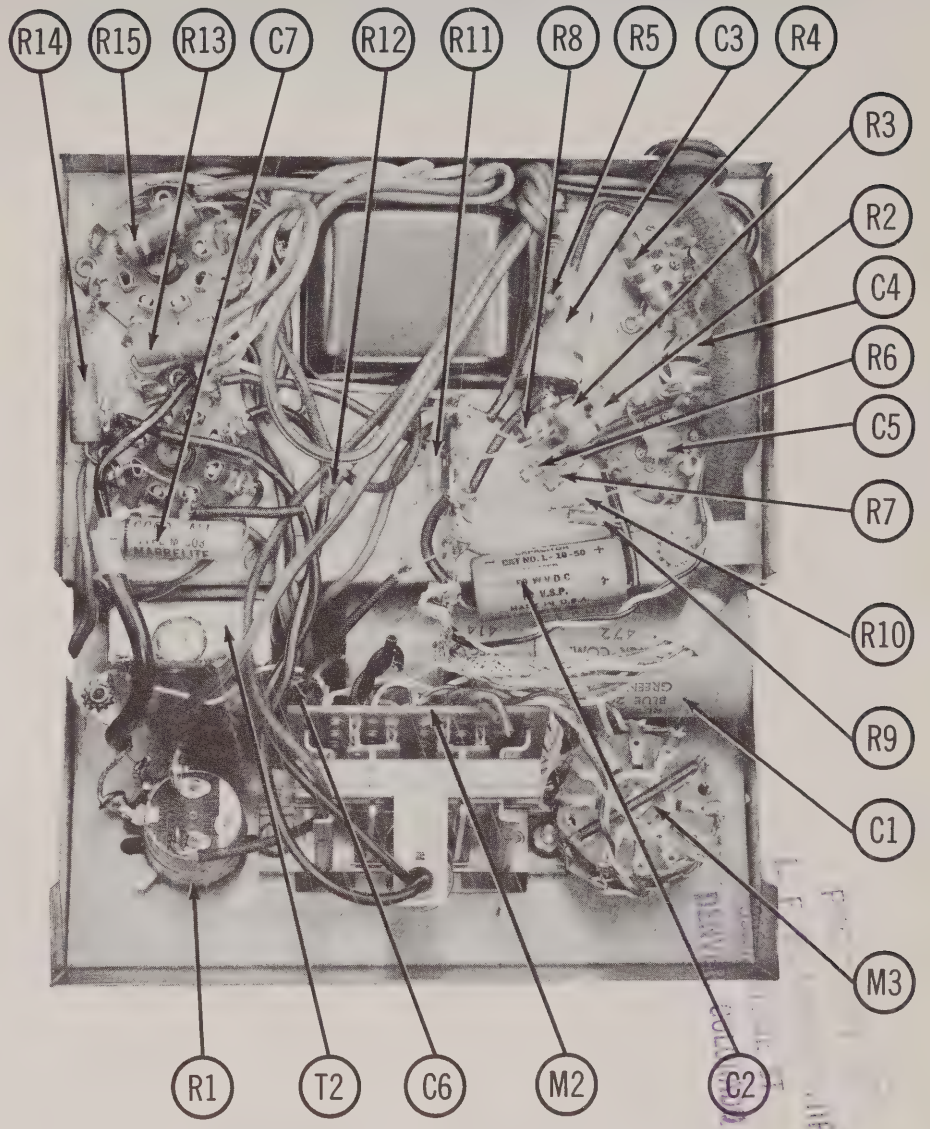
SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	MASCO PART No.	JENSEN PART No.	QUAM PART No.	
SP1	3½"	PM	45Ω			3A07Z45	

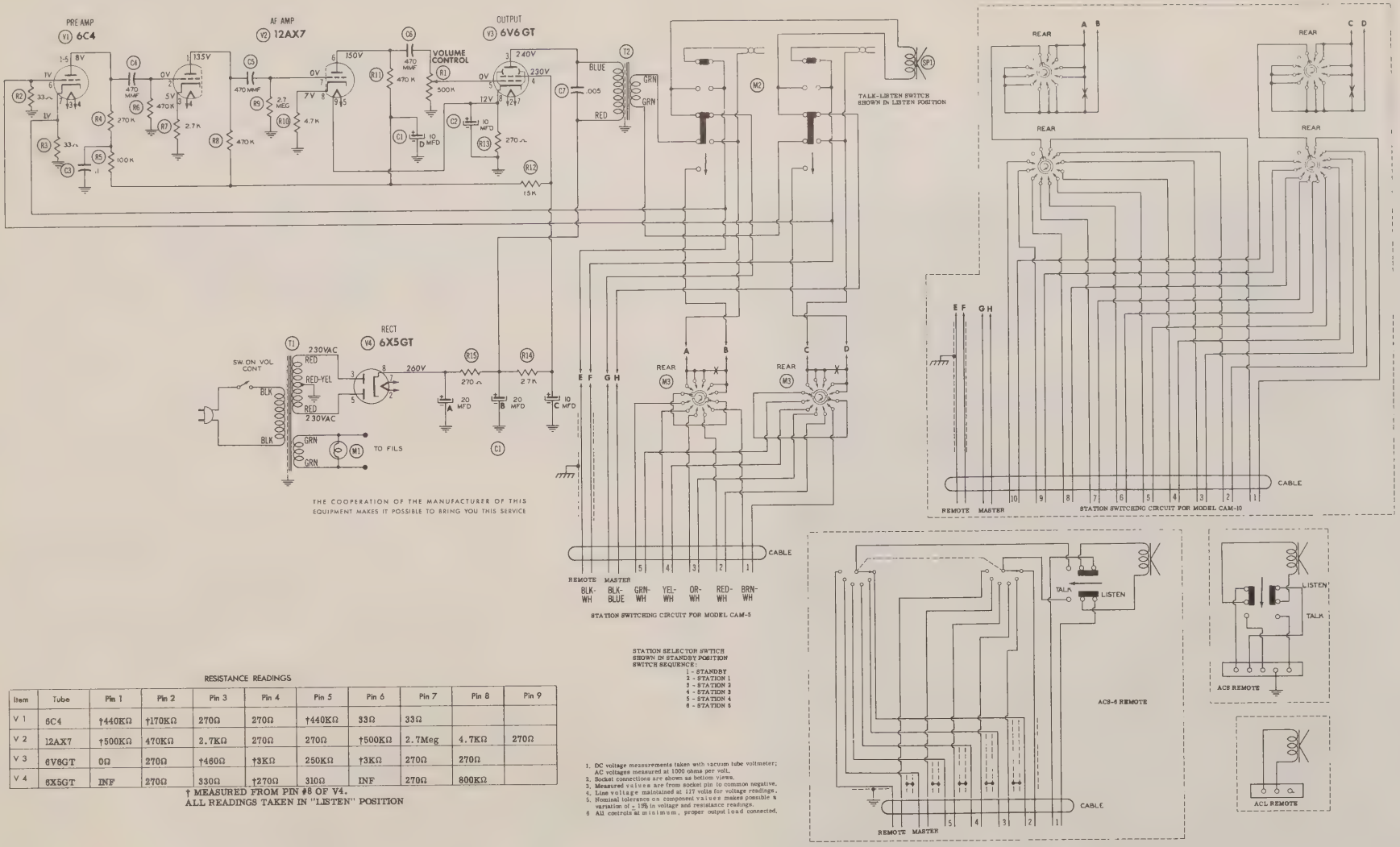
MISCELLANEOUS

ITEM No.	PART NAME	MASCO PART No.	NOTES
M1	Pilot Light		#47 Bayonet
M2	Switch		Talk-Listen
M3	Switch		Station Selector

CHASSIS—BOTTOM VIEW



MASCO MODEL CAM-5



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STATION SELECTOR SWTICH SHOWN IN STANDBY POSITION
SWITCH SEQUENCE:
1 - STANDBY
2 - STATION 1
3 - STATION 2
4 - STATION 3
5 - STATION 4
6 - STATION 5

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6C4	†440KΩ	†170KΩ	270Ω	270Ω	†440KΩ	33Ω	33Ω		
V 2	12AX7	†500KΩ	470KΩ	2.7KΩ	270Ω	270Ω	†500KΩ	2.7Meg	4.7KΩ	270Ω
V 3	6V6GT	0Ω	270Ω	†460Ω	†3KΩ	250KΩ	†3KΩ	270Ω	270Ω	
V 4	6X5GT	INF	270Ω	330Ω	†270Ω	310Ω	INF	270Ω	800KΩ	

† MEASURED FROM PIN #8 OF V4.
ALL READINGS TAKEN IN "LISTEN" POSITION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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PHOTOFACT* Folder

MOTOROLA MODELS 17T20, B, E, M, Y17T20, B, E, M, 21K19, B, Y21K19, B, 21T15, Y21T15, 21T16, B, E, Y21T16, B, E, 21T17, B, Y21T17, B (Ch. TS418, Y, VTS418, Y, VTS518, Y, WTS518, Y)

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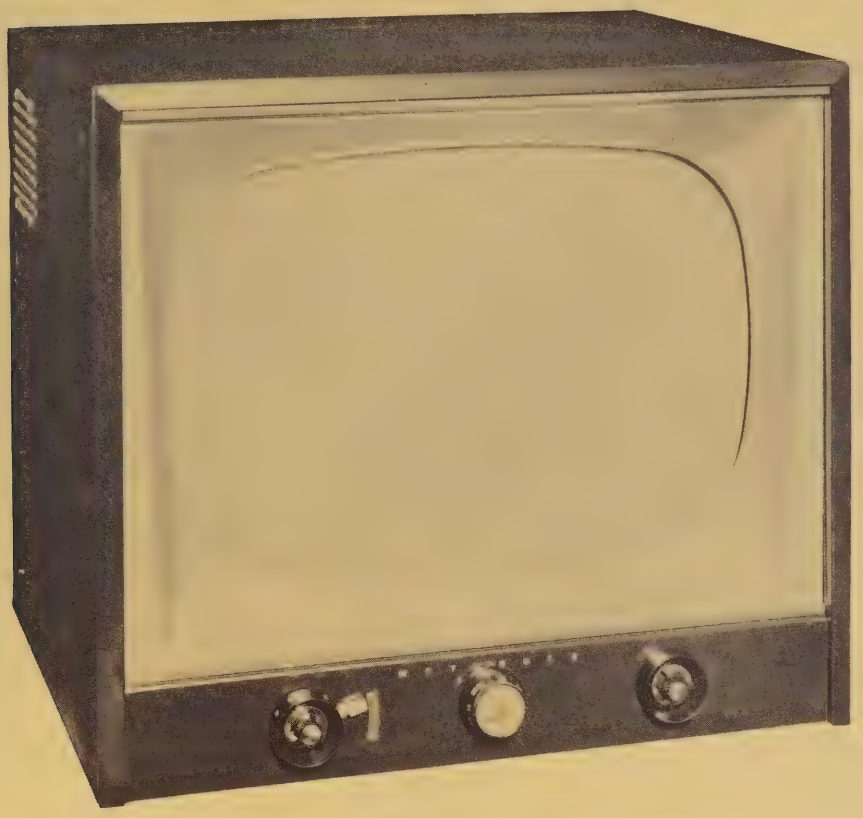

MODEL Y21T15

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DATE 3–55 SET 269 FOLDER 9

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[illegible] ST.
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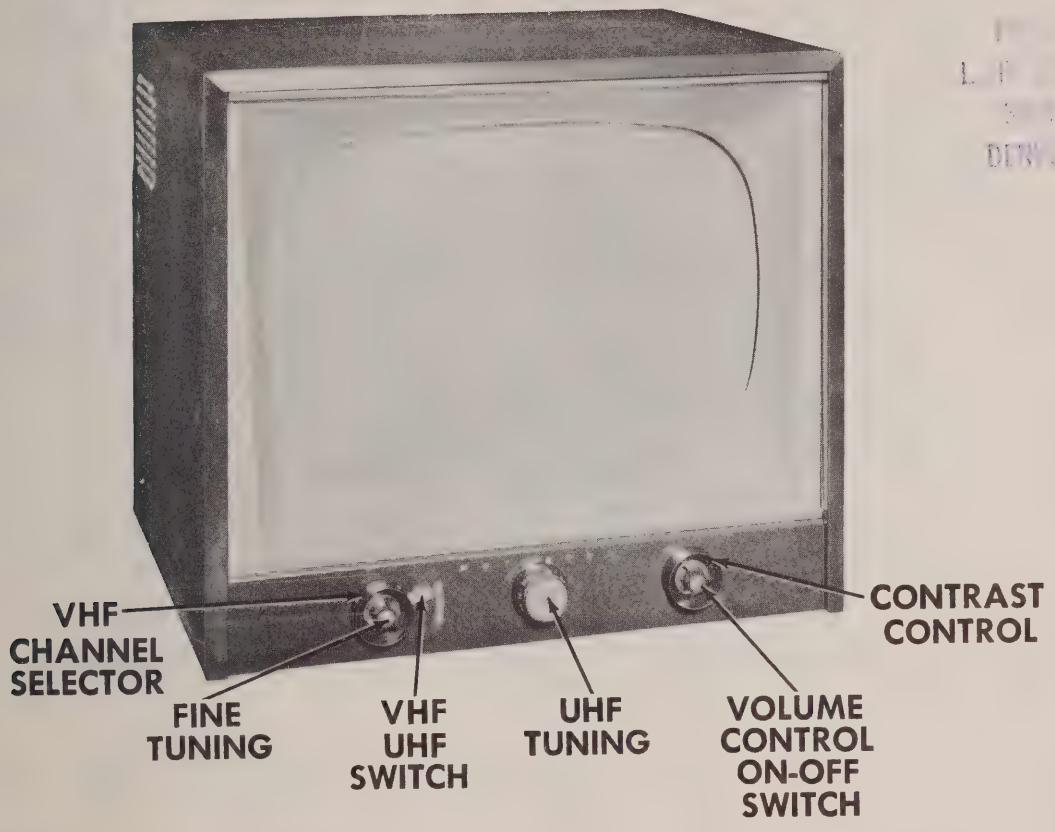

MOTOROLA MODEL Y21T15 (CH. WTS-518YA-02)

TRADE NAME	MOTOROLA MODELS	CHASSIS	TUNERS VHF	TUNERS UHF
	17T20	TS-418	TT-69	
	17T20B, 17T20E, 17T20M	VTS-418	TT-69	
	21K19, 21K19B, 21T15, 21T16, 21T16B, 21T16E	WTS-518	TT-69B	
	21T17, 21T17B	VTS-518	TT-69	
	Y17T20	TS-418Y	WTT-24AY	VTT-50MA
	Y17T20B, Y17T20E, Y17T20M	VTS-418Y	WTT-24AY	VTT-50MA
	Y21K19, Y21K19B, Y21T16, Y21T16B, Y21T16E	WTS-518Y	WTT-24CY	VTT-50MA
	Y21T15	WTS-518YA-02	WTT-24CY	VTT-50MA
	Y21T17, Y21T17B	VTS-518Y	WTT-24AY	VTT-50MA

MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC - 60 Cycle RATING 1.23 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 26.4MC, Sound IF 21.9MC (Intercarrier)

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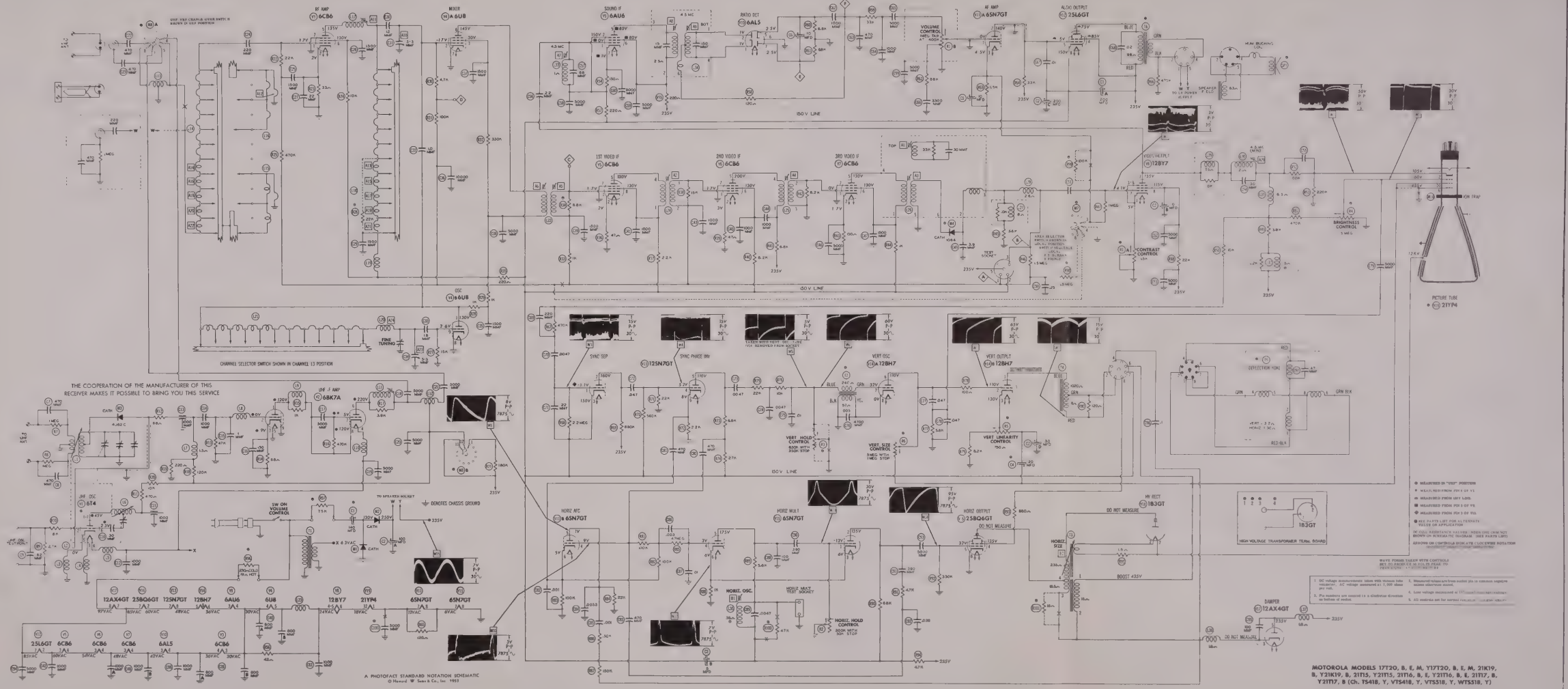
DATE 3-55 SET 269 FOLDER 9

MOTOROLA MODELS 17T20, B, E, M, Y17T20, B, E, M, 21K19, B, Y21K19, B, 21T15, Y21T15, 21T16, B, E, Y21T16, B, E, 21T17, B, Y21T17, B (Ch. TS418, Y, VTS418, Y, VTS518, Y, WTS518, Y)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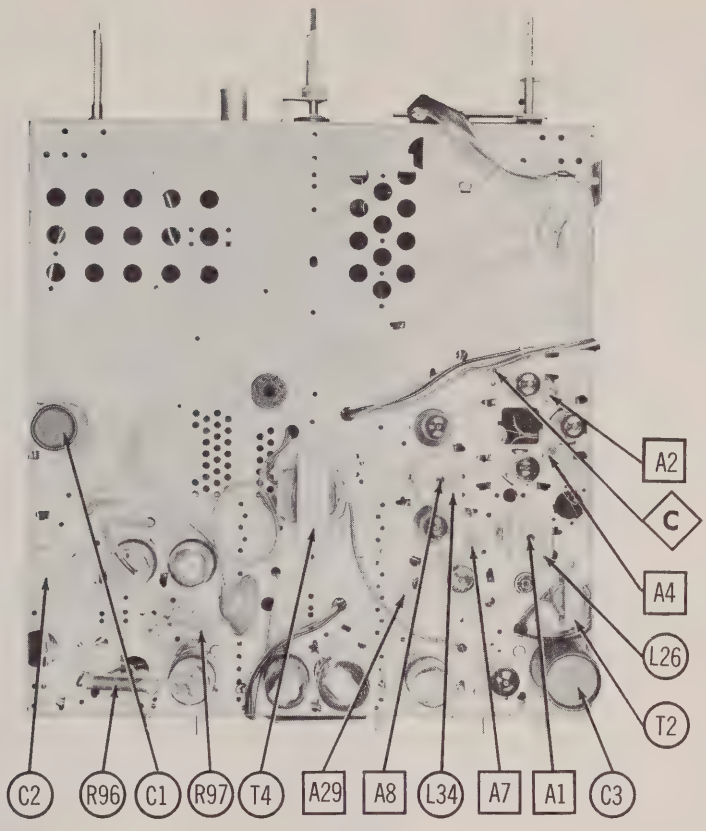
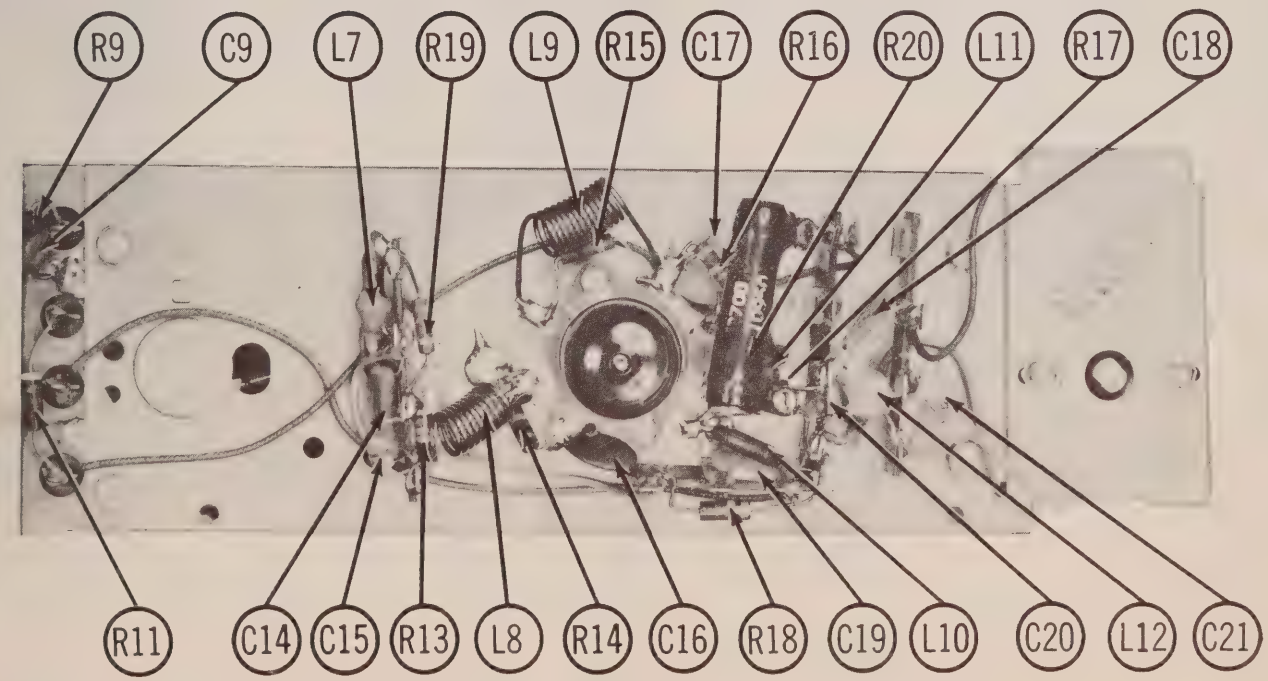
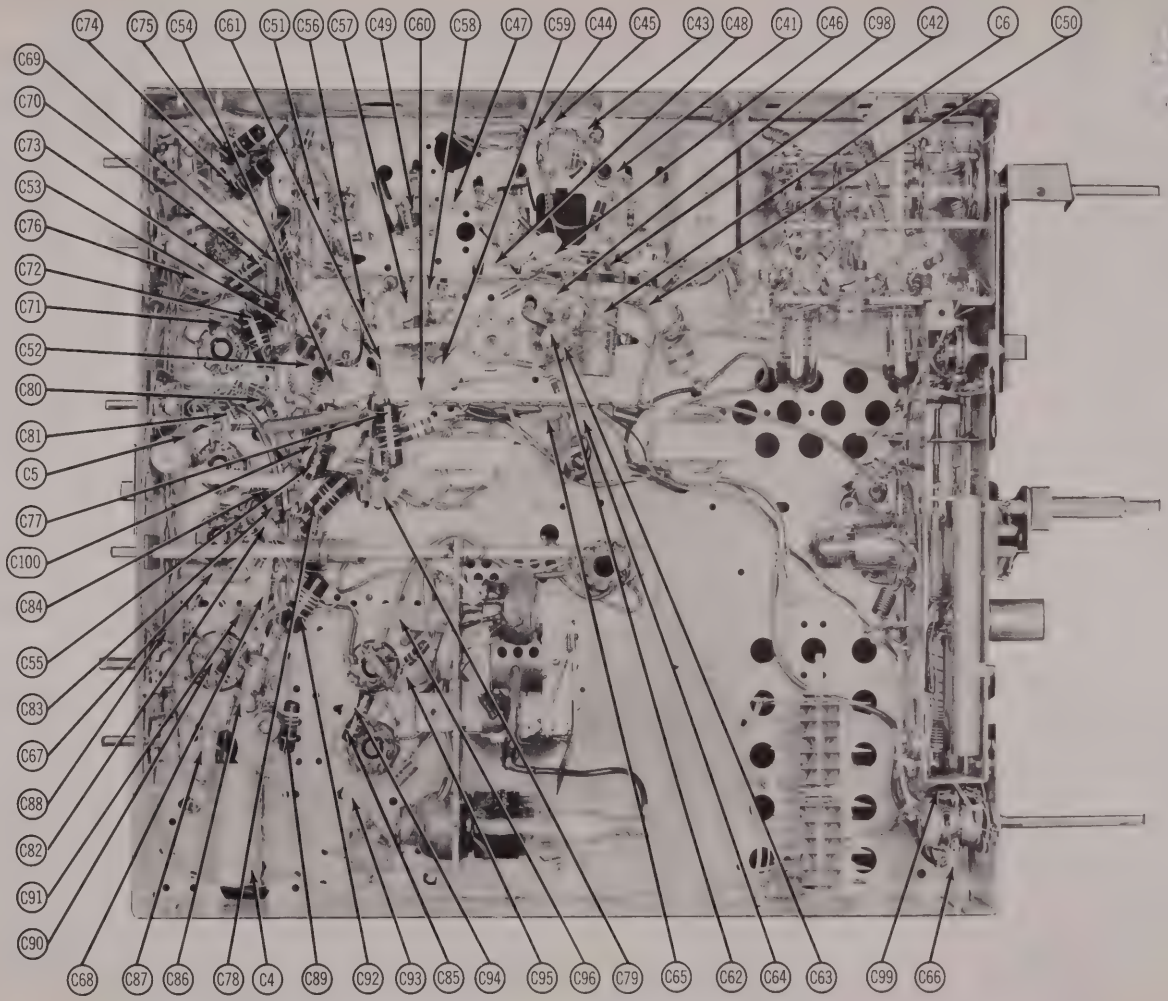


CHASSIS TOP VIEW

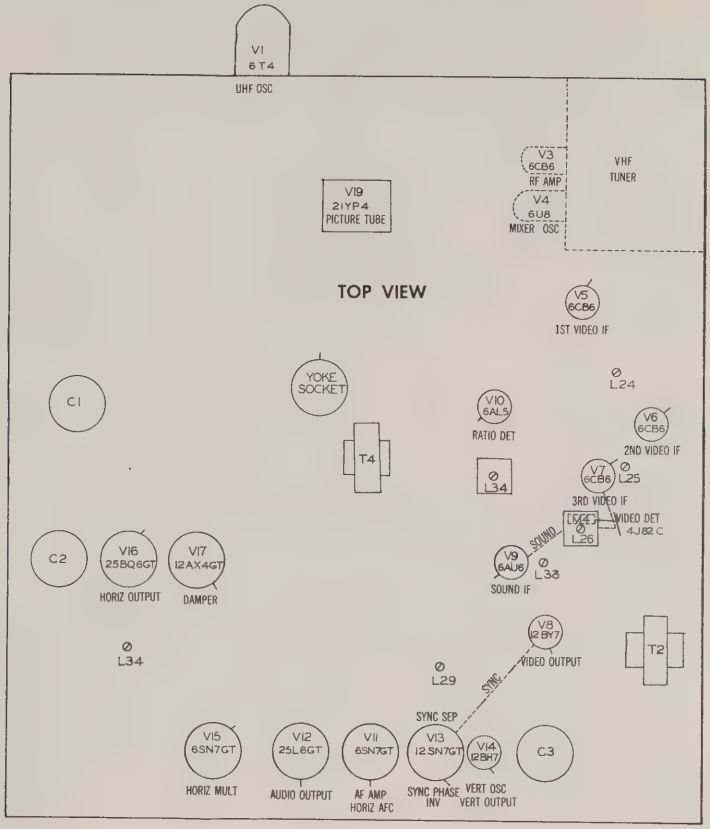


UHF TUNER TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

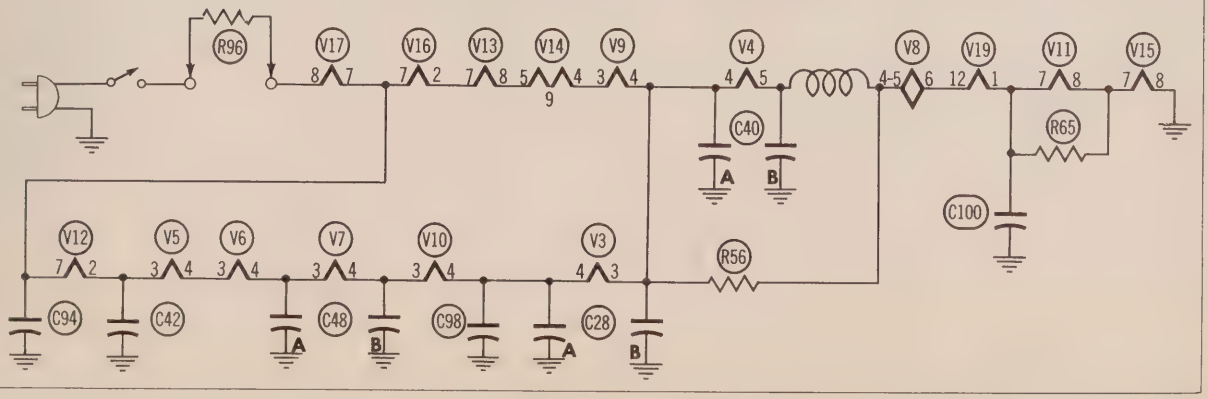
POWER SUPPLY FAILURE
No raster, no sound - **Selenium Rectifiers (M1 & M2)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V4, V5, V6, V7, V8, V12 (V1 & V2 UHF only)**
No pic, no sound, has snow - **V3, V4, V5**
No pic, has sound, has raster - **V8, V19**
Has pic, no sound - **V9, V10, V11, V12**

SYNC FAILURE
No vert. sync - **V13, V14**
No horiz. sync - **V11, V13, V15**
No vert. or horiz. sync - **V13**

SWEEP FAILURE
No raster, has sound - **V15, V16, V17, V18, V19**
No vertical deflection - **V14**
Poor vert. linearity or foldover - **V14**
Poor horiz. linearity or foldover - **V15, V16, V17**
Narrow picture - **V15, V16, V17, V18, M1, M2**
Vert. off freq. - **V13, V14**
Horiz. off freq. - **V11, V13, V15**

Note: Since this receiver employs tubes used in a series-parallel filament network, an open filament in any tube in series may cause the set to be inoperative. (See circuit below.)



SET 269 FOLDER 9

MOTOROLA MODELS 17T20, B, E, M, Y17T20, B, E, M, 21K19, B, Y21K19, B, 21T15, Y21T15, 21T16, B, E, Y21T16, B, E, 21T17, B, Y21T17, B (Ch. TS418, Y, VTS418, Y, WTS518, Y, WTS518, Y)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
Remove the horizontal output tube (V16) from its socket and replace with a dummy 35BQ6 which has all pins clipped off except pins 2 and 7 (filament). This will eliminate high voltage shock hazard and RF interference. If a dummy 35BQ6 is not available, another type tube with similar filament characteristics and base connections may be used.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery to point Ⓐ. Connect the positive lead to chassis. Attenuate sweep generator output to maintain approximately 3 volts peak to peak on scope.
On some coils two peaks may occur. Use the peak that occurs when the core is positioned near the outer end of the coil. Disconnect the antenna by removing antenna plug from its socket.
Disable the local oscillator by connecting a short jumper from pin 9 (grid) of 6U8 (V4) to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to point Ⓑ. Low side to chassis.	34.5MC (50MC Swp)	21.9MC 22.9MC 28.6MC	Any	Vert. Amp. thru 47KΩ to point Ⓐ. Low side to chassis.	A1, A2, A3, A4	Adjust A1 to place sound marker in center of trap notch. Adjust A3 to place 28.6MC marker at 50% as in Fig. 1. Adjust A3 for flat-topped response. Adjust A4 to place 22.9MC marker at 50%. Due to interaction between adjustments it may be necessary to repeat adjustment of A1 thru A4 to obtain response similar to Fig. 1.
2.	"	High side to point Ⓑ. Low side to chassis.	"	21.9MC 22.9MC 28.6MC	"	"	A5, A6	Connect a short jumper across R30. Adjust A5 and A6 simultaneously for response similar to Fig. 2. If necessary, SLIGHTLY retouch A1 to place sound marker in center of trap notch.

NOTE: To check for regeneration decrease sweep generator output until there is considerable decrease in amplitude of response curve on scope. Any regeneration will be indicated by sharp peaks on the response curve. Remove short across R30.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

If a signal generator capable of producing a 4.5MC signal of crystal accuracy is not available, follow the procedure outlined under "Sound IF Alignment Using TV Signal and VTVM".

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3	.001MFD	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point Ⓒ. Common to chassis.	A7, A8	Attenuate generator output to maintain not more than -5 volts at VTVM. Adjust for maximum deflection.
4	"	"	"	"	DC probe to point Ⓓ. Common to chassis.	A9	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING TV SIGNAL AND VTVM

Restore set to normal operating condition and tune in a local TV station.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3				Tune in any local station.	DC probe to point Ⓒ. Common to chassis.	A7, A8	Adjust fine tuning and contrast controls for -5 volts on VTVM. If necessary, remove antenna and stray feed signal into receiver by placing antenna near antenna terminals until less than -5 volts is obtained at VTVM. Adjust A7 and A8 for maximum deflection.
4				"	DC probe to point Ⓓ. Common to chassis.	A9	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Repeat steps 3 and 4.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60- modulation and 450KC sweep. Use 120- sawtooth voltage to scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3	.001MFD	High side to point Ⓑ. Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. amp. to point Ⓔ. Low side to chassis.	A7, A8	Remove stabilizing capacitor C8. Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
4	"	"	"	"	"	Vert. amp. to point Ⓓ. Low side to chassis.	A9	Reconnect stabilizing capacitor C8. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5	.005MFD	High side to pin 11 (cathode of picture tube). Low side to chassis.	4.5MC (Unmod)	Any unused low noise channel.	DC probe to point Ⓒ. Low side to chassis.	A29	Adjust generator for -5 volts at VTVM. Adjust A29 for MINIMUM deflection.

ALTERNATE 4.5MC TRAP ALIGNMENT

Tune in a local TV station. Adjust A29 clockwise until 4.5MC beat just appears in the picture then adjust A29 counter clockwise until 4.5MC beat again appears in picture. Adjust A29 clockwise so that the core is approximately centered between the points where the 4.5MC beat appeared in the picture.

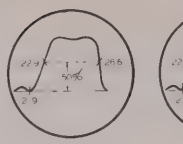


FIG. 1

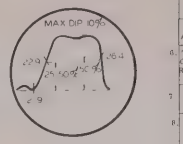


FIG. 2

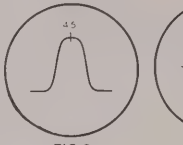


FIG. 3

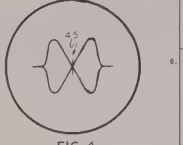


FIG. 4

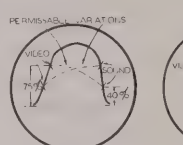


FIG. 5

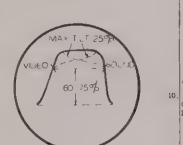


FIG. 6

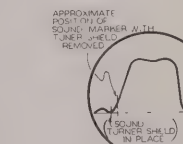


FIG. 7

RF AND MIXER ALIGNMENT

Remove bias battery from point A and connect point Ⓐ to chassis with a short jumper.
Tune the antenna coils to the video side of bandpass and the RF coils to the sound side of the bandpass.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 220Ω Carbon Resistors	Across VHF antenna terminals with L501 in each lead.	177MC (80MC Swp)	175.25MC 179.75MC	7	Vert. Amp. thru 47KΩ to point Ⓒ. Low side to tuner chassis.	A10	Adjust for response similar to Fig. 5
7.	"	"	213MC (80MC Swp)	211.25MC 215.75MC	13	"	A11	Adjust for response similar to Fig. 5. Repeat step 6.
8.	"	"	207MC (90MC Swp)	205.25MC 209.75MC	12	"	A12	Check all high band channels for response similar to Fig. 5. If necessary, adjust A12 by repositioning coil. Its approximate correct position is 1/8" from metal shield. Varying the portion of coil end wire extending thru the shield affects band width and position of markers. If adjustment of A12 was necessary, repeat steps 6, 7 and 8.
			201MC (90MC Swp)	199.25MC 203.75MC	11			
			195MC (90MC Swp)	193.25MC 197.75MC	10			
			189MC (90MC Swp)	187.25MC 191.75MC	9			
			183MC (90MC Swp)	181.25MC 185.75MC	8			
			177MC (90MC Swp)	175.25MC 179.75MC	7			
9.	"	"	85MC (80MC Swp)	83.25MC 87.75MC	6	"	A13, A14	Adjust in order given by compressing or expanding coil turns for response similar to Fig. 6.
			76MC (90MC Swp)	74.25MC 78.75MC	5		A15, A16	
			69MC (90MC Swp)	67.25MC 71.75MC	4		A17, A18	
			63MC (90MC Swp)	61.25MC 65.75MC	3		A19, A20	
			57MC (90MC Swp)	55.25MC 59.75MC	2		A21, A22	

OSCILLATOR ALIGNMENT

Remove shorting jumpers from pin 9 of V4 to chassis, and from point Ⓐ to chassis.
Reconnect bias supply as under "Video IF Alignment".
Use only enough sweep generator output to provide usable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.
When VHF tuner cover is replaced, the sound markers on channels 2 thru 6 must fall in the trap notch within a maximum clockwise rotation of 30 degrees from mid-range setting of fine tuning control. On channels 7 thru 13 the sound markers must fall in the trap notch with a maximum rotation of ±30 degrees from the mid-range setting of the fine tuning control.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with L501 in each lead.	190MC (90MC Swp)	197.75MC	10	Vert. Amp. thru 47KΩ to point Ⓒ. Low side to chassis.	A23 L20	Adjust to place sound marker slightly higher in frequency than the sound trap notch (See Fig. 7). This allowance must be made due to removal of tuner shield. With tuner shield replaced the sound marker should move down into the trap notch. Check channels 7 thru 13 noting whether sound marker for each channel falls just above the trap notch. If more than ± 30 degree rotation of fine tuning control is necessary to place sound marker in proper position on any high band channel compress or expand coil turns of L24, then switch back to channel 10 and readjust A23 for response similar to Fig. 7. L24 should be adjusted to compensate for channels 10 thru 13 and A23 for channels 7 thru 10.
			213MC (90MC Swp)	215.75MC	13			
			207MC (90MC Swp)	209.75MC	12			
			201MC (90MC Swp)	203.75MC	11			
			195MC (90MC Swp)	191.75MC	9			
			183MC (90MC Swp)	185.75MC	8			
			177MC (90MC Swp)	179.75MC	7			
11.	"	"	85MC (90MC Swp)	87.75MC	6	"	A24	Set fine tuning control to its mid-range position, then turn 15 degrees in a clockwise direction. Adjust by compressing or expanding coil to place sound marker just above trap notch as in Fig. 7.
12.	"	"	78MC (90MC Swp)	81.75MC	5	"	A25	"
13.	"	"	69MC (90MC Swp)	71.75MC	4	"	A26	"
14.	"	"	63MC (90MC Swp)	65.75MC	3	"	A27	"
15.	"	"	57MC (90MC Swp)	59.75MC	2	"	A28	"

IF SENSITIVITY CHECK

Short R30 as in step 2.
Disable local oscillator by grounding pin 9 of V4. Set contrast control fully clockwise.
Calibrate scope for approximately 18 volts peak to peak by connecting a 6.3VAC filament source to the vertical amplifier input terminals.
Connect the high side of the AM signal generator through a .001MFD capacitor to point Ⓒ. Low side to chassis. Adjust the signal generator for a 23MC signal modulated 30% at 400%.
Connect the vertical amplifier of the oscilloscope to pin 11 (cathode) of picture tube.
Less than 500 microvolts signal generator output should provide 18 volts peak to peak indication on scope.
Move high side of signal generator to point Ⓐ thru .001MFD capacitor.
Less than 100 microvolts signal generator output should provide 18 volts peak to peak on scope.
Remove short across R30 and from pin 9 of V4 to chassis.

OVERALL SENSITIVITY CHECK

Connect signal generator across VHF antenna terminals with 120Ω in each lead. Set the signal generator to the center frequency (modulated 30% at 400%) of channel 2 (see steps 8, 7, 8 and 9 under "Sweep Generator Frequency" column for center frequencies of channels 2 thru 13).
Leave scope connected to picture tube cathode. Adjust fine tuning control for maximum indication on scope. A signal generator output of less than 15 microvolts should produce 18 volts peak to peak response on scope on channels 2 thru 6.
A signal generator output of less than 30 microvolts should produce 18 volts peak to peak response on scope on channels 7 thru 13.

AUDIO SENSITIVITY CHECK

Connect the high side of signal generator through a .005MFD capacitor to pin 2 (grid) of 12BY7 (V6). Low side to chassis.
Set contrast control fully clockwise. Connect the DC probe of VTVM to point Ⓒ. Common to chassis.
Adjust signal generator for 4.5MC (unmodulated). A .01 volt signal generator output should produce -10 volts deflection on VTVM.

UHF TUNER ALIGNMENT

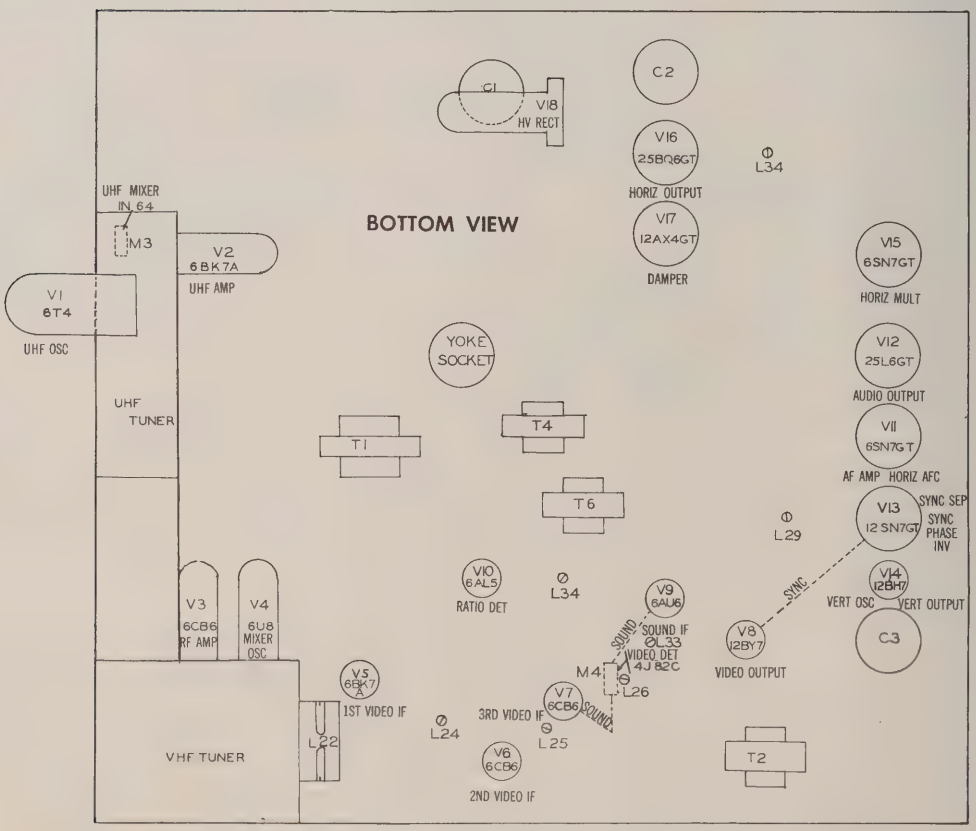
This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion of the receiver is not recommended in the field.

MOTOROLA MODELS 17T720, B, E, M, 21K19, B, Y21K19, B, 21T13, Y21T13, B, 21T13, B, Y21T13, B, 21T17, B, (CH. TS418, T, VTS418, T, VTS518, T, WTS518, T)

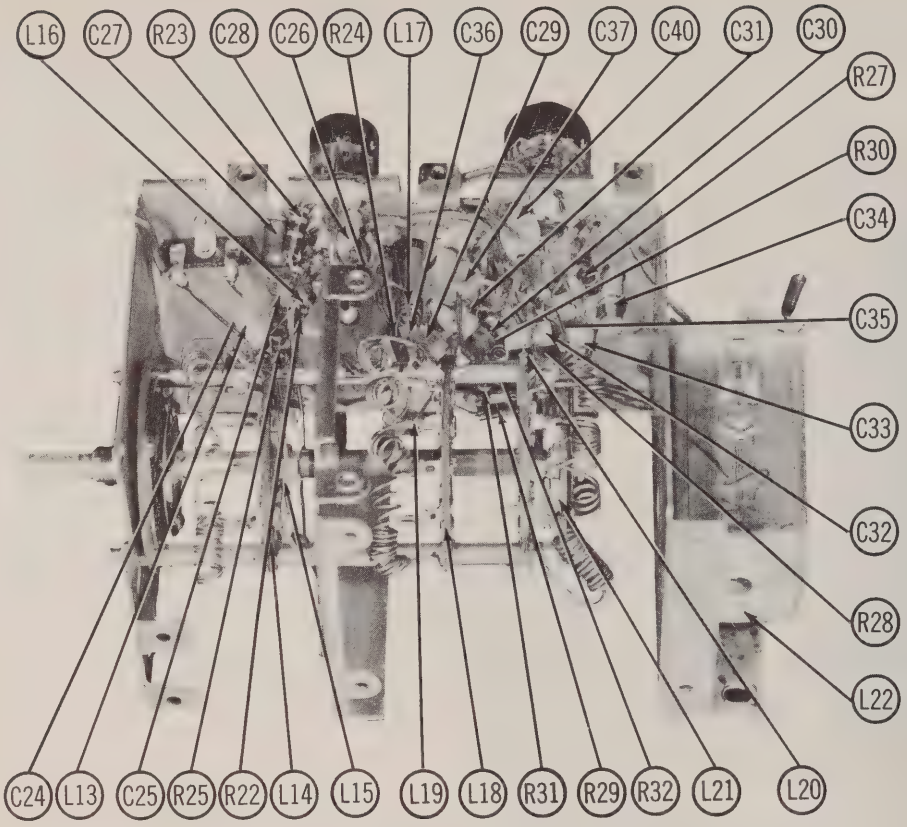
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6T4	†▲10KΩ	20KΩ	0Ω	.1Ω	0Ω	20KΩ	†▲10KΩ		
V 2	6BK7A	INF	47KΩ	68Ω	.1Ω	0Ω	†▲100Ω	INF	INF	0Ω
V 3	6CB6	2Meg	33Ω	10Ω	12Ω	■220Ω	■10.2KΩ	0Ω		
V 4	6U8	■2.2KΩ	1.6Meg	■330KΩ	10Ω	8Ω	■220Ω	0Ω	0Ω	15KΩ
V 5	6CB6	1.5Meg	47Ω	20Ω	19Ω	■2.2KΩ	■2.2KΩ	0Ω		
V 6	6CB6	1.5Meg	47Ω	19Ω	17Ω	†6.8KΩ	■8.2KΩ	0Ω		
V 7	6CB6	.3Ω	150Ω	17Ω	15Ω	■1KΩ	■1KΩ	0Ω		
V 8	12BY7	200Ω	1Meg	200Ω	8Ω	8Ω	6Ω	†4KΩ	†22KΩ	200Ω
V 9	6AU6	♦1Ω	80KΩ	12Ω	10Ω	†300Ω	†300Ω	♦150Ω		
V 10	6AL5	INF	INF	15Ω	12Ω	6.8KΩ	0Ω	6.8KΩ		
V 11	6SN7GT	400KΩ	†33KΩ	1.5KΩ	300KΩ	22KΩ	100KΩ	4Ω	2Ω	
V 12	25L6GT	INF	20Ω	†280Ω	†80Ω	†33KΩ	200KΩ	22Ω	80KΩ	
V 13	12SN7GT	■2.2Meg	†680KΩ	80KΩ	22KΩ	■9.5KΩ	2.2KΩ	20Ω	19Ω	
V 14	12BH7	▲1KΩ	▲3Meg	9KΩ	12Ω	19Ω	▲3Meg	700KΩ	57Ω	14Ω
V 15	6SN7GT	200KΩ	†72KΩ	1KΩ	5Meg	†10.3KΩ	1KΩ	2Ω	0Ω	
V 16	25BQ6GT	■0Ω	20Ω	†72KΩ	■680Ω	330KΩ	22KΩ	22Ω	0Ω	TOP CAP ▲18Ω
V 17	12AX4GT	†80Ω	▲50Ω	400KΩ	INF	†80Ω	▲300KΩ	22Ω	25Ω	
V 18	1B3GT		PINS	1 - 8	HAVE	INF RESISTANCE				TOP CAP ▲253Ω
V 19	21YP4	4Ω	†1.5Meg	PIN 6 4Ω	PIN 10 ▲19.5Ω	PIN 11 ▲100KΩ	PIN 12 6Ω			

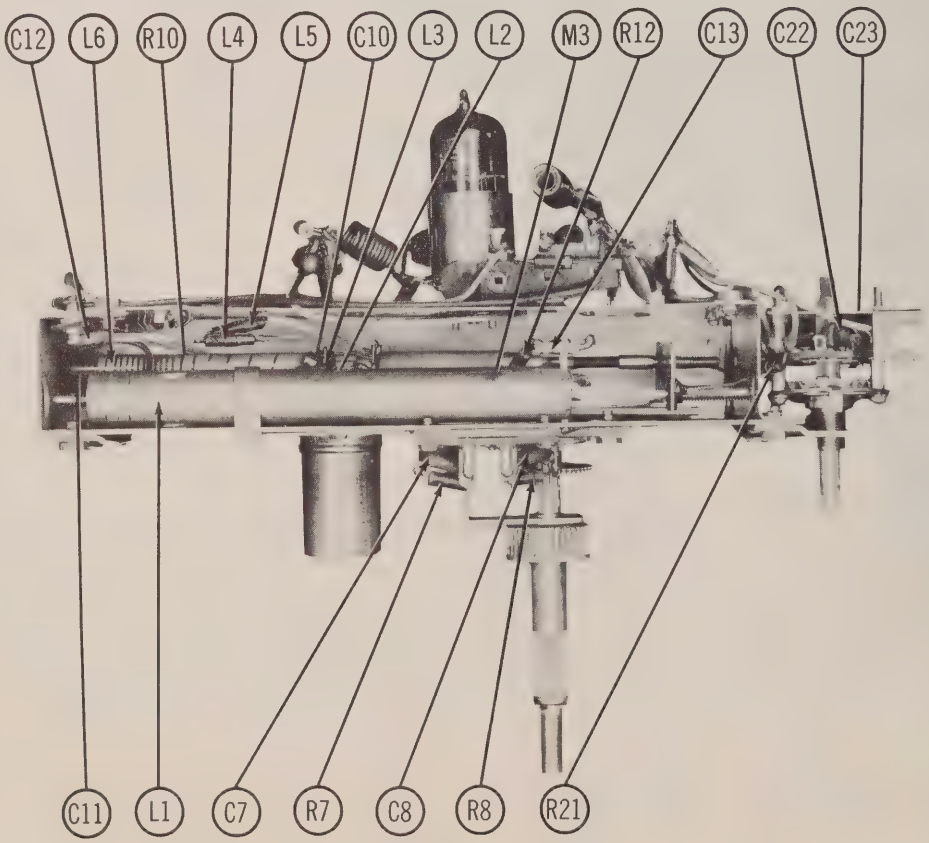
ALL MEASUREMENTS TAKEN IN "VHF" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM OUTPUT OF M2.
▲ MEASURED IN "UHF" POSITION
■ MEASURED FROM 150V LINE
♦ MEASURED FROM PIN 2 OF V9
▲ MEASURED FROM PIN 3 OF V17



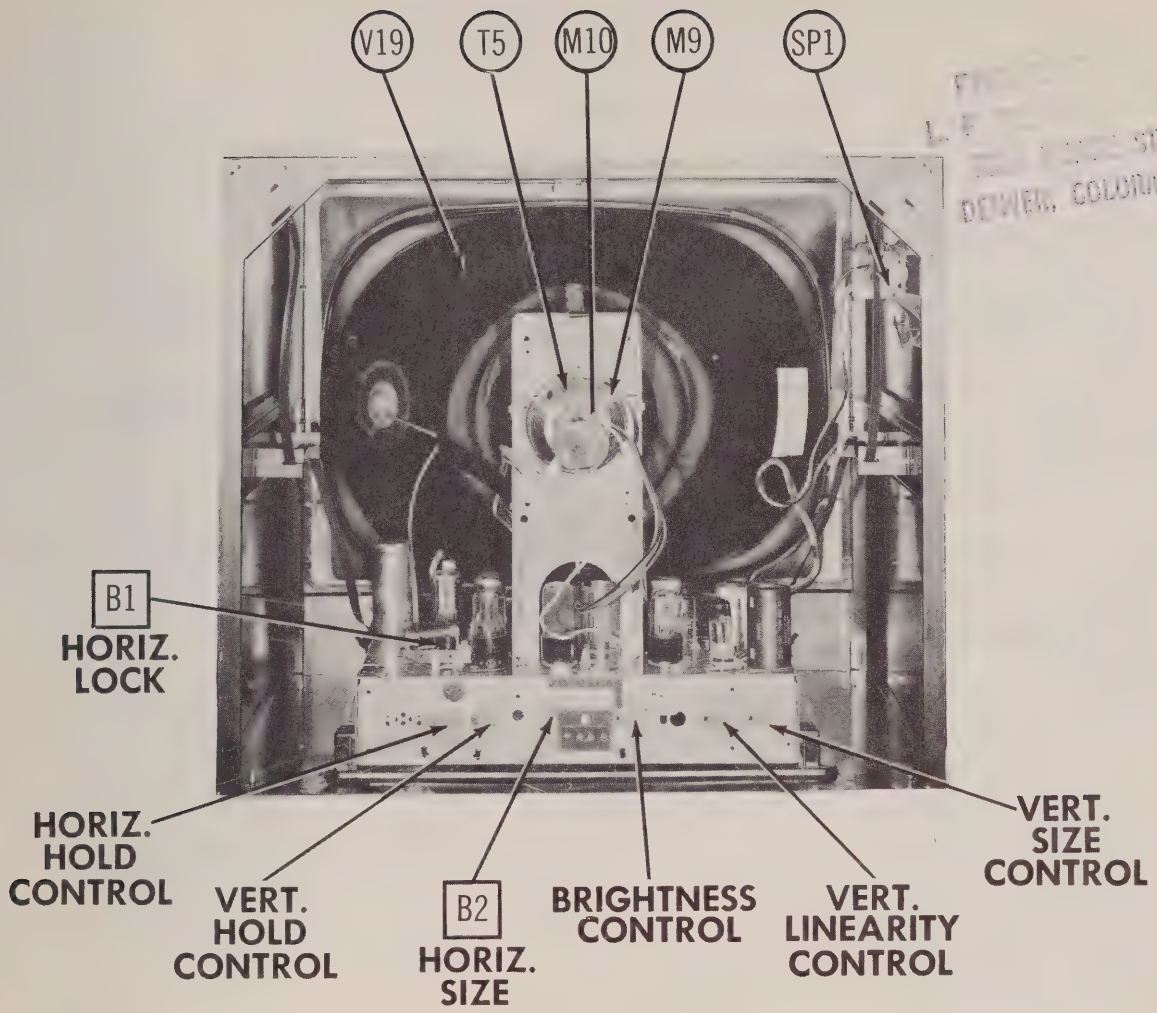
TUBE PLACEMENT CHART



VHF TUNER-RIGHT SIDE



UHF TUNER



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Shunt the horizontal oscillator coil (L34) to ground with a .25MFD, 400 volt capacitor. This may be done with the chassis in the cabinet by placing the capacitor across the 2 pin receptacle on rear of chassis.

Reduce the width of the picture with the horizontal size adjustment (B2) so that the right edge of the raster can be seen. Adjust the horizontal hold control for approximately 1/16" of sync pulse. (The blanking pulse is the dark gray bar at the right edge of the raster and the sync pulse is a darker gray bar at the right edge of the blanking pulse).

Remove the .25MFD capacitor across L34.

Adjust the horizontal oscillator slug (B1) until the sync pulse is approximately 1/16" as above. Re-set the horizontal size adjustment (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

Since adjustment of B2 affects the vertical size it may be necessary to readjust the vertical size control.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16 and V17. Check M1 and M2. Check adjustment B2. Check R93, R91, C93, C92, C91, T3, T4A and other associated components.

DRIVE LINES

Check by substitution V16 and V17. Check C91, C92, C93, R93, T3, T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15, V16 and V17. Check C87 for open. Check L35, C89, C88, R88 and other associated components.

XMAS TREE EFFECT

Check by substitution V15, V16 and V17. Check T3 and T5 for internal arcing. Check C84, C85, C89, R88, R89, R90, L35 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V14. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T4, T5B, C2D, C4, R5, R79 and other associated components.	Check T2, C76, R6 and other associated components.

INSUFFICIENT SWEEP

Substitute V14. Check vertical size and vertical linearity controls for proper operation. Check T4, T5B, R6 and other associated components.

COMPRESSED AT BOTTOM

Substitute V14. Check R6, C78, C77 and other associated components.

COMPRESSED AT TOP

Substitute V14. Check C2D, C4, R5, R79, T4 and other associated components.

FOLDS

Substitute V14. Check C77, C78, R77, R79 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V13. Check C69, C70, C72, R69, R73, R74 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V14. Check C73, C76, C75, R3, R73 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V11 and V15. Check C80, C81, C87, C89, C88, C85, R88, L35 and other associated components.

HORIZONTAL BENDING

Check by substitution V13, V11 and V15. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V8. Check L29, L30, L31, L32, R49, R48, C2B, C52, C54, C55 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A29. Check video IF alignment.

POOR CONTRAST

Substitute V8. Check video crystal detector. Check picture tube. Check L28, L29, C51, C55 and other associated components.

NEGATIVE PICTURE

Substitute V8. Check picture tube. Check video crystal detector. Check C51, C55, C54, L27, L29, L32 and other associated components.

SMEAR

Substitute V8. Check L28, L29, L31, L27, L32, C51, C54 and C55. Check video IF alignment.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, V11 and V12. Check stages V11 and V12 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C65, C66, C67, C68, R64, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A9. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check R96. Check AC interlock assembly. Check switch on volume control. If UHF tuner filaments fail to light, check T1. If filaments light, check R97, C1, M1 and M2. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check R97. Check M1 and M2. Check B+ filter and decoupling network.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	UHF Osc.	6T4 *	6T4	7DK	* 6AF4 used in some sets.
V2	UHF IF Amp.	6BK7A	6BK7A	9AJ	
V3	RF Amp.	6CB6	6CB6	7CM	
V4	Mixer-Osc.	6U8	6U8	9AE	
V5	1st Video IF Amp.	6CB6	6CB6	7CM	
V6	2nd Video IF Amp.	6CB6	6CB6	7CM	
V7	3rd Video IF Amp.	6CB6	6CB6	7CM	
V8	Video Output	12BY7	12BY7	9BF	
V9	Sound IF Amp.	6AU6	6AU6	7BT	
V10	Ratio Detector	6AL5	6AL5	6BT	
V11	AF Amp-Horiz. AFC	6SN7GT	6SN7GT	8BD	
V12	Audio Output	25L6GT	25L6GT	7S	
V13	Sync Sep-Sync Phase Inv.	12SN7GT	12SN7GT	8BD	
V14	Vert. Osc. - Vert. Output	12BH7	12BH7	9A	
V15	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	25BQ6GT	25BQ6GT	6AM	
V17	Damper	12AX4GT	12AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	MOTOROLA PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V19	21YP4 21YP4A 17HP4 17HP4B	21YP4 21YP4A ① 17HP4/17RP4 17HP4B ①	21YP4 21YP4A ① 17HP4/17RP4	21YP4 21YP4A ① 17HP4/17RP4 17HP4B ①	21YP4 21YP4A ① 17HP4/17RP4	12L 12L 12L 12L	① Aluminized

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1	140	150		AFHS1-70		XA004		FP117	TVL-1428	Note 1
C2A	▲100	300								
B	■10	300	23B712068	AFHS4-125		D109		FP419.4	TVL-4561	
C	▲200	150								
D	30	150								
C3A	▲200	150	23B710941	AFH2-109		B078		FP216.1	TVL-2444	
B	▲5	150								
C4	20	450	23A702450	PRS450/20		BR2045		TC75	TVA-1709	Note 2
C5	10	50	23A90205	PRS50/10		BR105		TC32	TVA-1304	
C6	10	50	23A90205	PRS50/10		BR105		TC32	TVA-1304	
C7	470			SI470	D6-471	TP46	GP1K-470	UC-5347	5GA-T47	
C8	470			SI470	D6-471	TP46	GP1K-470	UC-5347	5GA-T47	
C9	62				TCN-62	TN17	N750K-620			
C10	30									
C11	1000									
C12	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C13	1000									
C14	1000			SI1000	D6-102	TP52	GP2K-102	UC-521	5HK-D1	
C15	1				TCZ-1	TZ03	NP0K-010		5TCCB-V1	
C16	150			SI100N750	TCN-150	TN26	N750K-151		5TCU-T15	
C17	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C18	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C19	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C20	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C21	5000			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C22	470			SI470	D6-471	TP46	GP1K-470	UC-5347	5GA-T47	
C23	470			SI470	D6-471	TP46	GP1K-470	UC-5347	5GA-T47	
C24	220		21R115854	SI220	D6-221	TP39	GP1K-221	UC-5322	5GA-T22	
C25	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5GA-D15	
C26	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5GA-D15	
C27	22		21R400492	SI22	D6-220	TP22	GP1K-220	UC-5422	5GA-Q22	
C28A	800	}	21R400943	BPD-2X001	DD3-102	DK069	812-001	DCD-521	5HK-2D1	
B	800	}								
C29	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5GA-D15	
C30	12		21R114073							
C31	.5-3		21K710943							
C32	1.0		21R114071		TCZ-1	TZ03	GP1K-010		5TCCB-V1	
C33	18		21R115640	SI18	D6-180	TP12	GP1K-180	UC-5418	5GA-Q18	
C34	.5-3		21K710943							
C35	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C36	10000		21R482726	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C37	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C38	5000		21R115312	BPD-005	DD-502	K082	801-005	DC-525	5HK-D5	
C39	1500		21R120100	BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C40A	800	}	21R400493	BPD-2X001	DD3-102	DK069	812-001	DCD-521	5HK-2D1	
B	800	}								
C41	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C42	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C43	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C44	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C45	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C46	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C47	1500		21R120100	BPD-0015	DD-152	K069	801-0015	DC-5215	5HK-D15	
C48A	1000	}	21R400937	BPD-2X001	DD3-102	DK069	812-001	DCD-521	5HK-2D1	
B	1000	}								
C49	3.9		21R115953							
C50	.25	100	8R9810	P288-25		PJ2P25		PT4025	2TM-P25	
C51	.1	100	8R9814	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C52	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C53	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C54	30		21R470329							
C55	.1	400	8R121006	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C56	2.2		21R115949		TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	MOTOROLA PART No	AEROVOX PART No	CENTRALAB PART No	CORNELL DUBILIER PART No	ERIE PART No	MALLORY PART No	SPRAGUE PART No	NOTES
C57	68		21R400928							
C58	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C59	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C60	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C61	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C62	1000		8R121678	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C63	470		21R115856	S1470	D6-471	TP46	GPIK-471	UC-5347	5GA-T47	
C64	1000		8R121678	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C65	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C66	3300		8R121569	BPD-0033	DD-332	K071	801-0033	DC-332	5HK-D33	
C67	.01	400	8R121902	P488-01	D6-103		BTS-1000	DC-510	5HK-01	
C68	.02	600	SR9871	P688-02	DF-203	CUB682		PT612	6TM .S2	
C69	220	1000	21R115905		D30-221	YT-22	1N34Y-221		1SGAB-T22	
C70	.0047	400	8K490222	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	4TM-D47	
C71	22		21R400942		TCN-22	TN06	N750K-220		5TCCU-Q22	
C72	.047	400	8K490232	P488-047	DF-503	CUB455		PT415	4TM-S5	
C73	.0047	400	8K490222	P488-005	D6-502	CUB4D5	GP2-333-502	PT425	4TM-D5	
C74	.0047	400	8K490222	P488-005	D6-502	CUB4D5	GP2-333-502	PT425	4TM-D5	
C75	.01	400	8K490238	P488-01	D6-103	CUB401	GP2-333-103	PT411	4TM-S1	
C76	4700			BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C77	.047	400	8K490332	P488-05	DF-503	CUB455		PT415	4TM-S5	
C78	.047	400	8K490232	P488-05	DF-503	CUB455		PT415	4TM-S5	
C79	5000	1000	21R120033		D30-502	YT-22			20KBB-D5	
C80	470		21R115856	S1470	D6-471	TP46	GPIK-471	UC-5347	5GA-T47	
C81	470		21R115856	S1470	D6-471	TP46	GPIK-471	UC-5347	5GA-T47	
C82	.001	600	SR8866	P688-001	D6-102	CUB5D1	GP2L-102	PT621	6TM-S1	
C83	470		21R115856	S1470	D6-471	TP46	GPIK-471	UC-5347	5GA-T47	
C84	.0033	600	8K490247	P688-0033	D6-332	CUB6D33	GP2-333-332	PT6233	6TM-D33	
C85	.001	1000	8K490268	P1DS-001	DD-102	CUB1D1	3KV-102	PT1621	MD-D1	
C86	003	600	8R121569	P688-003	D6-302	CUB6D3	GP2-333-302	PT623	6TM-D3	
C87	.01	400	8R121903	P488-01	D6-103	CUB401	GP2-333-103	PT411	4TM-S1	
C88	100		21R115900	S1D00	D6-101	TP94	GPIK-101	UC-531	5GA-T1	
C89	.0047	400	8K490227	P488-005	D6-502	CUB4D5	GP2-333-502	PT425	4TM-D5	
C90	390	500	33K114760	1469-0004		SW5739		MC343		
C91	390	500	33K114760	1469-0004		SW5739		MC343		
C92	.039	400	8K490231	P488-039		CUB4S39		PT439	4TM-S39	
C93	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C94	5000	3000	21R120033		DD30-502				20HK-D5	
C95	100	3000	21R121634	HVD-30-100	DD30-101		3KV-101	PT401		
C96	.1	300	SR9854	P38-1	DF-104	PZ2P1		PT401	4TM-P1	
C97	47	3000	33K119403	HVD-30-47	DD30-470				30GAB-T1	
C98	1000		21R115386	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C99	5000		21R115312	BPD-005	DD-502	K080	801-005	DC-525	5HK-D5	
C100	5000	3000	21R120033		DD30-502				20HK-D5	Note 3

Note 1. Some versions may use a 200MFD ⑤ 150V in this application.
Note 2. Some versions may use a 10MFD ⑤ 450V in this application.
Note 3. Not used in chassis with suffix A-00.

CONTROLS

ITEM No.	RATING RESIST-ANCE	RATING WATTS	MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	150Ω	½	18T733221	*QJ-590		F1-7	UF152L	Contrast Panel - Note 4
B	1Meg	½				R2-62	UR16-735	Volume Tapped at 400KΩ-rear
C	Spring					R6-1	Not Req.	Attach to R1A
D	Switch					KB-1	UB-38	Attach to R1B
R2A	200KΩ	½	18A733160	Q11-139	A47-200K-S	AB-46	U-45	Horiz. Hold - Note 1
	with 50KΩ stop							
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3A	850KΩ with 350KΩ stop	½	18A733170	Q11-133	A47-1Meg-S	AB-59		Vert. Hold - Note 2 & 5
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-4		Attach to R3A
R4A	5Meg	½	18A733179	Q11-141	A47-5Meg-S	AB-57	U-67	Brightness - Note 6
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-4	Not Req.	Attach to R4A
R5A	750Ω	½	18A702475	Q11-105	A47-1000-S	AB-5		Vert. Linearity - Note 7
B	Shaft		Not Req.	Not Req.	RS-2	AK-4		Attach to R5A
R6A	5Meg with 1Meg stop	½	18A702443	Q11-141	A47-5Meg-S	AB-57	U-67	Vert. Size - Note 3 & 8
B	Shaft		Not Req.	Not Req.	RS-2	AK-4	Not Req.	Attach to R6A

* CONCENTRIKIT EQUIVALENT: KIT K-3, BASE ELEMENTS & SHAFTS: B17-109 & P1-222 (PANEL)
B12-157X & R4-306 (REAR)
76-1 SWITCH

Note 1: Connect a 47KΩ resistor in series with the right hand terminal of the control & the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
Note 2: Connect a 330KΩ resistor in series with the right hand terminal of the control & the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
Note 3: Connect a 1Meg resistor in series with the right hand terminal of the control & the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminals down.)
Note 4: Some versions may use alternate control part no's. 18B732190 and 18B733977.
Note 5: Some versions may use an alternate control part no. 18K733447.
Note 6: Some versions may use an alternate control part no. 18K733451.
Note 7: Some versions may use an alternate control part no. 18K733454.
Note 8: Some versions may use an alternate control part no. 18B733462.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	MOTOROLA PART No.	IRC PART No.	NOTES
R7	1Meg	½		BTS-1Meg	
R8	1Meg	½		BTS-1Meg	
R9	2700Ω	½		BTS-2700	
R10	18KΩ	½		BTS-18K	
R11	470Ω	½		BTS-470	
R12	68Ω	½		BTS-68Ω	
R13	47KΩ	½		BTS-47K	
R14	82Ω	½		BTS-82	

ITEM No	RATING OHMS	RATING WATT	MOTOROLA PART No.	IRC PART No.	NOTES
R15	1000Ω	½		BTS-1000	
R16	470KΩ	½		BTS-470K	
R17	3900Ω	½		BTS-3900	
R18	120KΩ	½		BTS-120K	
R19	220Ω	½		BTS-220	
R20	10KΩ	10		13/4A-10K	
R21	180KΩ	½		BTS-180K	
R22	22KΩ	½	6R6397	BTS-22K	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No	RATING OHMS	RATING WATT	MOTOROLA PART No	IRC PART No.	NOTES
R23	33Ω	½	6R2036	BTS-33	
R24	10KΩ	½	6R6004	BTS-10K	
R25	470KΩ	½	6R6032	BTS-470K	
R26	22KΩ	½	6R6397	BTS-22K	Note 1
R27	15KΩ	½	6R219	BTS-15K	
R28	1000Ω	½	6R6501	BTS-1000	
R29	100KΩ	½	6R6301	BTS-100K	
R30	4700Ω	½	6R6039	BTS-4700	
R31	100KΩ	½	6R6075	BTS-100K	
R32	330KΩ	½	6R6014	BTS-330K	
R33	1000Ω	½	6R6301	BTS-1000	
R34	68000Ω	½		BTS-68000	Note 2
R35	220Ω	½	6R3933	BTS-220	
R36	47Ω	½	6R5550	BTS-47	
R37	22000Ω	½	6R6009	BTA-22000	
R38	15KΩ	½	6R6477	BTS-15K	
R39	47Ω	½	6R5550	BTS-47	
R40	8200Ω	½	6R2004	BTS-8200	
R41	68000Ω	2	6R49349	BTB-68000	
R42	82000Ω	½	6R2004	BTS-8200	
R43	150Ω	½	6R6873	BTS-150	
R44	1000Ω	½	6R6301	BTS-1000	
R45	5600Ω	½	6R617	BTS-5600	
R46	1.5Meg	½	6R6480	BTS-1.5Meg	
R47	1Meg	½	6R6048	BTS-1Meg	
R48	22KΩ	2	6R2098	BTB-22K	
R49	39000Ω	5	17K733310		
R50	10KΩ	½	6R6054	BTS-10K	
R51	470KΩ	½	6R2096	BTS-470K	
R52	100KΩ	½	6R6031	BTS-100K	
R53	230KΩ	½	6R6407	BTS-230K	
R54	150Ω	½	6R3992	BTS-150	
R55	220Ω	½	6R3933	BTS-220	
R56	43Ω	10	17K713039		
R57	220Ω	½	6R3933	BTS-220Ω	
R58	120Ω	½	6R5551	BTS-120	
R59	33KΩ	½	6R6012	BTS-33K	
R60	680Ω	½	6R6054	BTS-680Ω	
R61	6800Ω	½	6R6428	BTS-6800	
R62	68KΩ	½	6R6074	BTS-68K	

ITEM No	RATING OHMS	RATING WATT	MOTOROLA PART No	IRC PART No.	NOTES
R63	1500Ω	½	6R6058	BTS-1500	
R64	33KΩ	½	6R6400	BTA 33K	
R65	270Ω	5	17K713028		
R66	470KΩ	2	6R2037S	BTB-470K	
R67	470KΩ	½	6R6032	BTS-470K	
R68	2.2Meg	½	6R3927	BTS-2.2Meg	
R69	68KΩ	½	6R6475	BTS-68K	
R70	560KΩ	½	6R5897	BTS-560K	
R71	22KΩ	½	6R6397	BTS-22K	
R72	2200Ω	½	6R6069	BTS-2200	
R73	6800Ω	½	6R6428	BTS-6800	
R74	2700Ω	½	6R5577	BTS-2700	
R75	22KΩ	½	6R6028	BTS-22K	
R76	10KΩ	½	6R6054	BTS 10K	
R77	5600Ω	½	6R6U7	BTS-5600	
R78	100Ω	½	6R6018	BTS-100	
R79	8200Ω	2	6K2257S	BTB-8200	
R80	120Ω	½	6R5551	BTS-120	
R81	100KΩ	½	6R6031	BTS-100K	
R82	100KΩ	½	6R6031	BTS-100K	
R83	100KΩ	½	6R6031	BTS-100K	
R84	22KΩ	½	6R6397	BTS-22K	
R85	4.7Meg	½	6R312	BTS-4.7Meg	
R86	*	7	6A720662		
R87	7.5Ω	5	17A710227		
R88	1.5Meg	½	6R3966	BTS-1.5Meg	Note 3
R89	100KΩ	½	6R6075	BTS-100K	Note 3
R100	47KΩ	½		BTS-47K	Note 4
R101	18Ω	½	6R3931	BTS-18	Note 1

* At normal room temperature R96 will read 230Ω. When tubes heat up it will read 180.
Note 1: Not used in some versions.
Note 2: Some versions may use a 10KΩ resistor in this application.
Note 3: Not used in versions 21T15 or YA715.
Note 4: Used in chassis with suffix B-01.

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI.	RATING SEC 1	RATING SEC 2	MOTOROLA PART No.	Stancor PART No	Merit PART No	Triad PART No	RCA TYPE No	Halldorson PART No.	Thordarson PART No.	NOTES
T1	117VAC	6.3VAC		25K733190-F	P-6134 ①	P2944 ②	T-14X ①		F5529 ①	21F08 ②	
	⑤ 105A	⑤ 7A			⑤ 8		⑤ 2				

① Drill one new mounting hole.
② Tape 6.3V center tap.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Rem PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	25K702429	B5702	A-3005		V405	A-8125	24A87 ②	A-97X
		25K710730 ①							
T3	Horiz. Output Trans.	24K733106 ③		HVD-29 *		X106 *	A-8224 *	F1Y-54 *	
T4	Vert Output Trans.	21S05① ④		A-3081 ②⑦		V308 ⑤ ⑥	A-8140 ⑤⑥	26857 ⑤⑥	A-110X ⑥
		25K721027 ⑦							
T5A	Yoke-Horiz (52MH)	25K732710 ⑧	DF503 ⑩⑪	MDF-74 ⑩	24D1 ⑩	Y70F25 ②	DY-10A ⑩	Y-11 ⑩⑪	Y-20-11 ⑩
B	Vert.(3MH)	24K732711 ⑧		⑪	⑪	⑫⑬	⑪		⑪

① Alternate vertical oscillator transformer.
② Drill one new mounting hole.
③ Includes V18 HV rectifier.
④ Alternate vertical output transformers.
⑤ Drill no mounting holes.
⑥ Connect as auto transformers.
⑦ Use 50 to 1 turns ratio.
⑧ Includes octal plug, motorola part no. 28A732677, does not include back cover and positioning device (Motorola part no. 48A721145).
⑨ Alternate deflection yoke.
⑩ Jumper terminals #1 and #8.
⑪ Use original back cover and positioning device.
⑫ Use original yoke damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Rem Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
		4		Jumper 7 & 8	4	4	
		Jumper 3 & 4		Jumper 5 & 6	Jumper 3 & 4	Jumper 3 & 2	
		1		1	1	1	
Special Notes →		⑬ ⑭		⑬ ⑭	⑬ ⑭		

⑬ Do not use horizontal centering control.
⑭ Connect a 1.8Ω ½ watt resistor in series with the #3 filament.
⑮ Jumper terminals #3 and #2.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI	IMPEDANCE SEC	MOTOROLA PART No	Stancor PART No	Merit PART No	Triad PART No	Halldorson PART No	Thordarson PART No	NOTES
T6	2.4KΩ	3.4Ω	25R10925	A-3876	A-2928	S-1X	Z.00.	24S50	① Alternate audio output transformer
			25K720128 ①						

SPEAKER

ITEM No	RATINGS SIZE	RATINGS FIELD	RATINGS V C IMP	MOTOROLA PART No	JENSEN PART No	OXAM PART No	NOTES
SP1	5 1/4"	EM	3.4Ω	50K732997		52E856	① Alternate 5 1/4" EM speakers
				50K732998 ①			② 5 1/4" EM speakers used in Models 21T7, and Y21T7
				50K733259 ②			③ & EM speakers used in models 21T7 and Y21T7
				50K734175 ③			
				50K734578 ③			
8	EM		3.4Ω	50K733122			
				50K733142 ③		8E856	
				50K733242 ③			
				50K733241			

COILS (RF-IF)

ITEM No	USE	DC RES PRI	DC RES SEC	MOTOROLA PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
L1	UHF Ant.Coil	60CT	0Ω					
L2	UHF Osc. Coupling	0Ω						
L3	UHF Cathode Choke	0Ω						
L4	UHF Fil. Choke	0Ω						
L5	UHF Fil. Choke	0Ω						
L6	UHF Osc. Plate Coil	0Ω						
L7	UHF B+ Choke	1.5Ω						
L8	UHF IF Coupling Coil	0Ω						
L9	UHF Neutr. Coil	0Ω						
L10	UHF Fil. Choke	.1Ω						
L11	UHF IF Output Coil	0Ω						
L12	UHF RF Choke	0Ω CT						
L13	VHF Ant. Matching Coil	0Ω CT		24A790033				Channels 2 thru 6
L14	VHF Ant. Coils	0Ω		24K703002				Channels 7 thru 13 part of switch
L15	VHF Ant. Shunt Coils	0Ω		24K703079				Channels 2 thru 6
L16	VHF Ant. Shunt Coils	0Ω		24K703078				Channels 7 thru 13
L17	VHF RF Coil	0Ω		24C703076				Channe. 3 position
L18	VHF RF Coils	0Ω		24K703003				Channels 2 thru 6 Channels 7 thru 13 part of switch
L19	VHF RF Choke	2Ω		24K792577				3.3 Microhenries, IRC part no. C1-1
L20	VHF Osc.Coil	0Ω		24K703097				Channel 13 position
L21	VHF Osc.Coils	0Ω		24C703001				Channels 2 thru 6, Channels 7 thru 13 part of switch
L22	1st. Video IF	.3Ω	.2Ω	34B702983				
L23	Fil. Choke	0Ω		34A733210				
L24	2nd. Video IF	.3Ω	.3Ω	1V711205	17-1064			
L25	3rd. Video IF	.3Ω	.3Ω	1V712106	17-1063			
L26	4th. Video IF	.4Ω	.4Ω	24K712304				Includes 21.9MC trap, 33KΩ resistor, 30MMF, cap. & series peaking coil
L27	Shunt Peaking Coil	8Ω		21R116554	19-3250 ▲	TV-185 ▲	6181 ▲	270 Microhenries, wound on 10KΩ resistor
L28	Series Peaking Coil	2.6Ω		24B711413	19-6033			28 Microhenries
L29	Series Peaking Coil	7.5Ω		24R120984	19-3250 ▲	TV-185 ▲	6181 ▲	240 Microhenries, wound on 10KΩ resistor
L30	4.5MC Trap	2.1Ω		24B792735	20-1004	TV-151	1468	
L31	Shunt Peaking Coil	6.5Ω		24R116950	19-3180	TV-184	6180	157 Microhenries
L32	Shunt Peaking Coil	15Ω		24K712371 *	19-3500 ●	TV-188 ●	6174 ●	450 Microhenries, wound on 1.2KΩ resistor
L33	Sound IF	1Ω		1V790341	17-3400	TV-151	1468	
L34	Ratio Detector	3.5Ω	.4OCT	24B702543	17-1033 †	TV-149 †	1468 †	Tertiary winding - .5Ω
L35	Horiz.Osc.	36Ω		24K701558 ■	19-1578	TV-183	6310	
L36	Cathode Choke	1.6Ω		24A733225	19-1005		4612	10 Microhenries
L37	RF Choke	1.6Ω		24A733225	19-1005		4612	10 Microhenries

* Alternate part no. 24K721912.
■ Alternate part no. 24K721064.
▲ Parallel with 10KΩ resistor.
● Parallel with 1.2KΩ resistor.
† Drill mounting holes.

MOTOROLA MODELS 17T730, B, E, M, Y17T730, B, E, M, 21T6 B, B-1, 21T17, Z, 21T6, 21T6B, Y, YA715B, Y, YA715B-1, Y, YA715B-2, B, 21T17Z

PARTS LIST AND DESCRIPTIONS (Continued)

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	MOTOROLA PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZIAN PART No.	
M1	.220A	48B700555 48B720023 ①	1236A	RS300	6S300	6Q4	300	① Alternate selenium rect.
M2	.220A	48B700555 48B720023 ①	1236A	RS300	6S300	6Q4	300	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		MOTOROLA PART No.	FEDERAL PART No.	SYLVANIA PART No.	
M3	4J82C		1N82	1N82 or 1N82A	UHF Mixer
M4	1064	*48K733204	1N60 or 1N64A	1N60 or 1N132	Video Det.

* Alternate part no's.
48C711052
48K711077
48K712198
48K712199
48K712200
48K722720
48K733158

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M5	Tuner	WTT-24C	VHF - Used in chassis with code suffix A-02
	Tuner	WTT-24CY	VHF - Used in chassis with code suffix A-02
	Tuner	TT-69	VHF - Chassis TS-418, VTS-418, VTS-518, WTS-518
	Tuner	WTT-24AY	VHF - Chassis TS-418Y, VTS-418Y, VTS-518Y, WTS-518Y
M6	Tuner	VTT-50MA	UHF - Chassis TS-418Y, VTS-418Y, VTS-518Y, WTS-518Y
M7	Switch	40A720172	Area Sel. -Used in ch. with code suffix B-00 & B-01.
M8	Switch		UHF-VHF--Models Y17T20, B, E, M;Y21K19, B;Y21T15; Y21T16, B, E;Y21T17, B.
M9	Centering Device	48A721145	Includes yoke cover.
M10	Ion Trap	24K711843	
M11	Correction Magnet	48K721915	Left-Hand - Alternate pt. #48K720969- Not used in some versions.
M12	Correction Magnet	48B721914	Right-Hand - Alt. part #48B720968-Not used in some versions.
	Cabinet	16K734287	Models 17T20, Y17T20
	Cabinet	16K734375	Models 17T20B, Y17T20B
	Cabinet	16K733521	Models 17T20M, Y17T20M
	Cabinet	16F733333	Models 21K19, Y21K19
	Cabinet	16K733334	Models 21K19B, Y21K19B
	Cabinet	16K734286	Models 21T16, Y21T16
	Cabinet	16K733519	Models 21T16B, Y21T16B
	Cabinet	16K733518	Models 21T16E, Y21T16E
	Cabinet	16E734337	Models 21T17, Y21T17
	Cabinet	16K734338	Models 21T17B, Y21T17B
	Cabinet	16K734376	Models 17T20E, Y17T20E
	Cabinet	16K733345	Models 21T15, Y21T15
	Knob	36C733401	VHF Channel Sel. -Models 17T20, B, M;Y17T20, B, M; 21K19, B;Y21K19, B; 21T16, B;Y21T16, B;21T17, B;Y21T17, B.
	Knob	36K734332	VHF Channel Sel. -Models 17T20E, 21T16E, Y21T16E, Y17T20E
	Knob	36C712027	VHF Channel Sel. -Models 21T15, Y21T15
	Knob	36K733402	Contrast-Models 17T20, B, M; Y17T20, B, M; 21K19, B; Y21K19, B; 21T16, B; Y21T16, B; 21T17, B; Y21T17, B.
	Knob	36K734333	Contrast-Models 17T20E, Y17T20E, 21T16E, Y21T16E
	Knob	36K712028	Contrast - Models 21T15, Y21T15
	Knob	36B733400	Fine Tuning & On-Off-Volume-Models 17T20, B, M; Y17T20, B, M; 21K19, B; Y21K19, B; 21T16, B; Y21T16, B; 21T17, B; Y21T17, B.
	Knob	36K734334	Fine tuning & on-off-volume - Models 17T20E, Y17T20E, 21T16E, Y21T16E
	Knob	36C712026	Fine tuning & on-off-volume - Models 21T15, Y21T15
	Knob	36C720949	UHF Channel Selector - Models Y17T20, B, M, Y21K19, B, Y21T16B, Y21T17, B
	Knob	36K720953	UHF Channel Selector - Models Y17T20E, Y21T16E, Y21T15
	Lever	36K721982	UHF-VHF - Models Y17T20, B, E, M, Y21K19, B, Y21T16, B, E, Y21T17, B, Y21T15
	Mask	13K733309	Models 17T20, B, E, M, Y17T20, B, E, M,
	Mask	13E734163	Models 21K19, B, Y21K19, B, 21T17, B, Y21T17, B
	Mask	13K734426	Models 21T16, B, E, Y21T16, B, E
	Scale	34C720956	UHF Channel Indicator - Models Y17T20, B, M, Y21K19, B, Y21T16, B
	Scale	34K720957	UHF Channel Indicator - Models Y17T20E, Y21T16E, Y21T15
	Scale	34C720946	UHF Channel Indicator -Models Y21T17, B
	Safety Glass	61C732777	Models 17T20, B, E, M, Y17T20, B, E, M
	Safety Glass	61K732778	Models 21K19, B, Y21K19, B, 21T15, Y21T15
	Safety Glass	61K733388	Models 21T16, B, E, Y21T16, B, E
	Safety Glass	61K734345	Models 21T17, B, Y21T17, B

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C95, R93 and other associated components.	Check L35, R90, R89, R94, R88, C88, C90, C93, C85 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V16 and V17. Check M1 and M2. Check R96, R97, R93, C93, C91, C96, T3 and other associated components.

BLOOMING

Check by substitution V15, V16, V17 and V18. Check M1 and M2. Check R96, R97, R93, C93 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6, V7 and V8. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

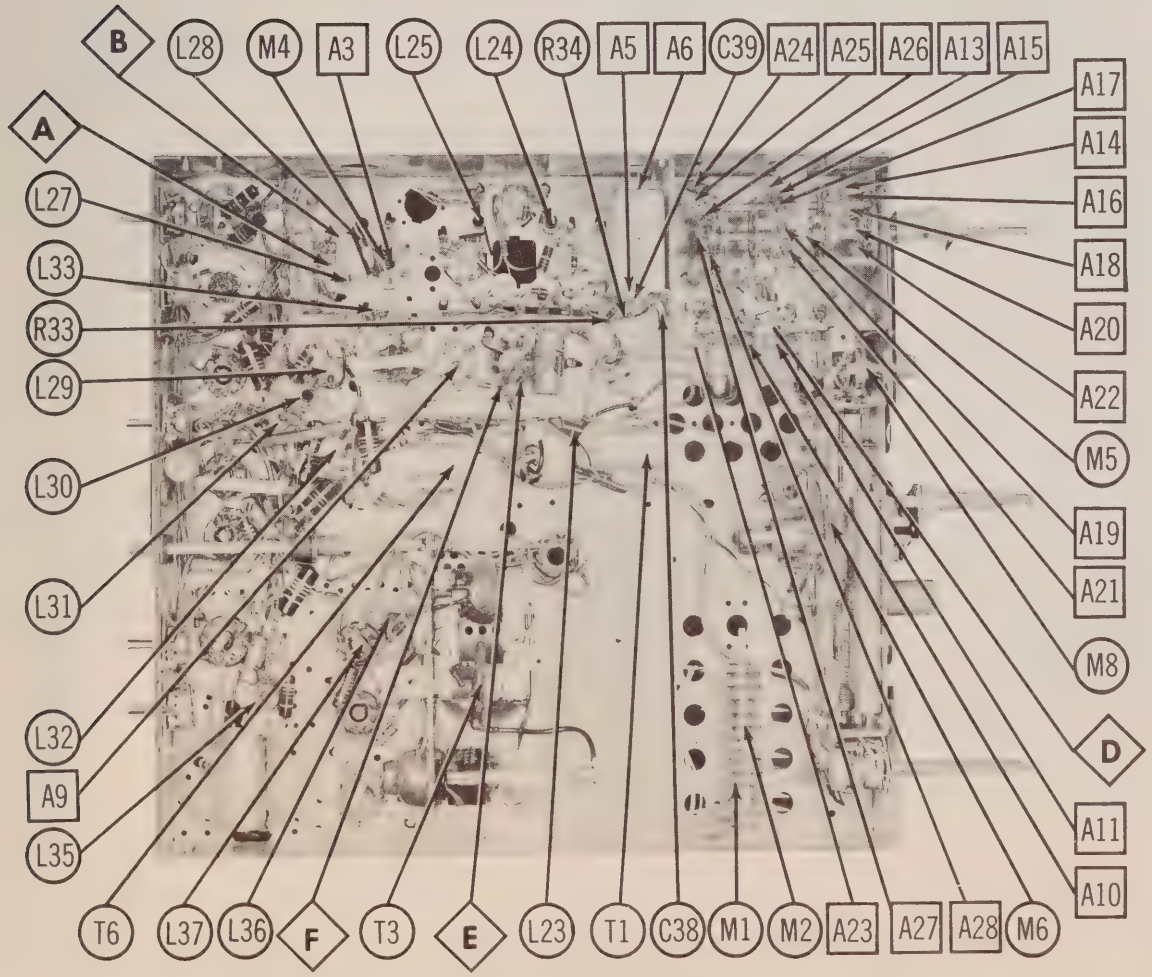
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.



MOTOROLA MODELS 17T20, B, E, M, Y17T20, B, E, M, 21K19, B, Y21K19, B, 21T15, Y21T15, 21T16, B, E, Y21T16, B, E, 21T17, B, Y21T17, B (Ch. TS418, Y, VTS418, Y, VTS518, Y, WTS518, Y)

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustments of VHF tuner oscillator adjustments, it is necessary to remove the chasssis from the cabinet. (See disassembly instructions).

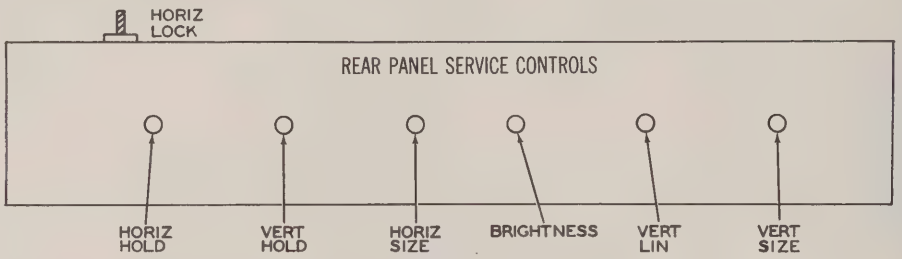
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove metal screws from top molding. Remove molding and safety glass. (Use extreme caution when removing safety glass.)

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at the center of its range and adjust the horizontal oscillator slug (L35) until picture synchronizes horizontally. (For location see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L34) located on bottom of chassis. See tube placement chart.

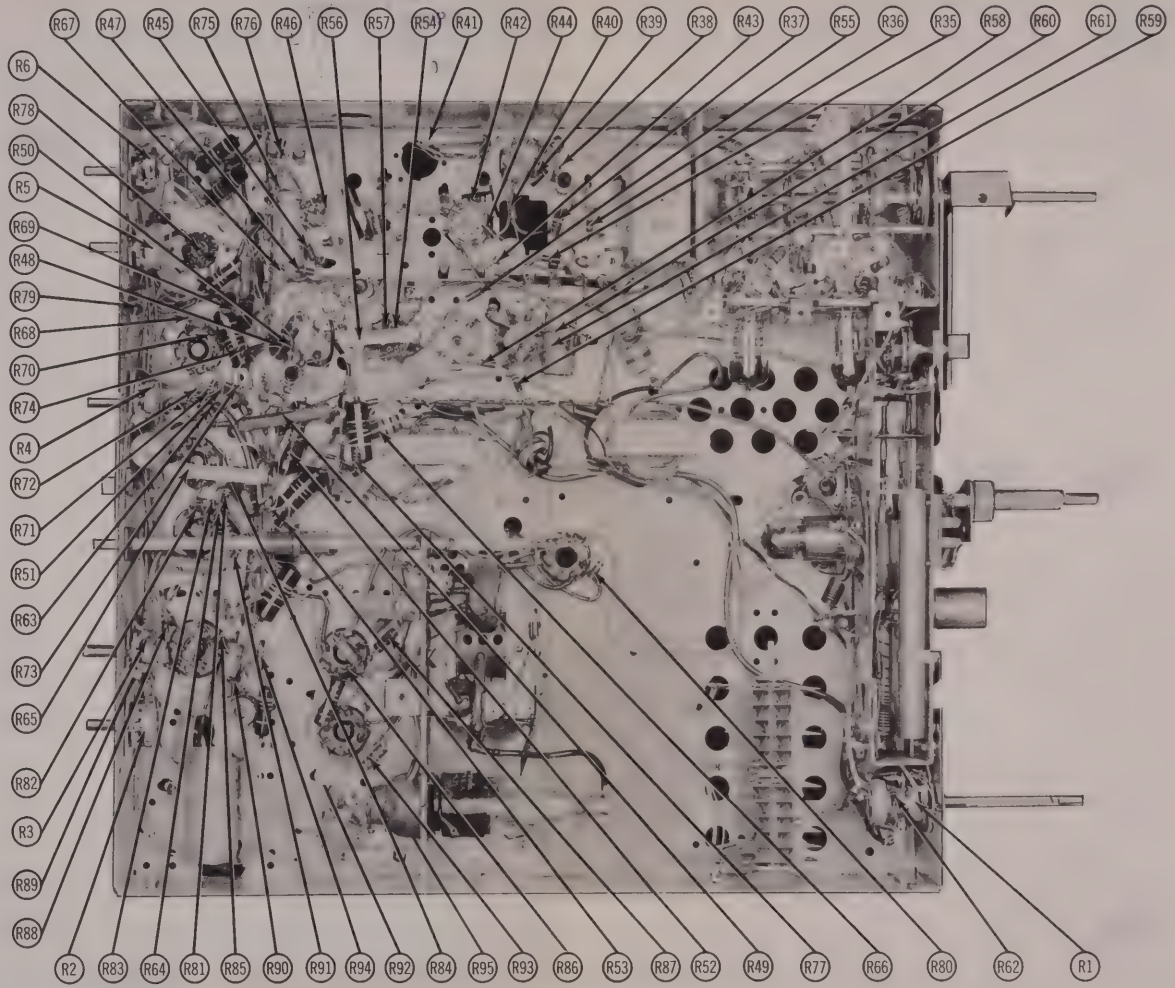
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 6 push-on type knobs and 1 push-on type lever (VHF-UHF switch) from front panel.
2. Remove 1 metal screw from rear cover. Remove rear cover.
3. Remove 2 metal screw from each antenna terminals. Remove antenna terminals from cabinet and antenna leads from stand-off insulators.
4. Disconnect speaker leads.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 4 speaker nuts. Remove speaker.

Note: If it is necessary to remove the chassis for servicing, it is also necessary to remove the speaker. The speaker is the electro-magnetic type and must be connected for proper operation.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. [illegible] SHIP
[illegible] ST
[illegible] HARD

NATIONAL
MODEL HORIZON 5

NATIONAL
MODEL HORIZON 5

TRADE NAME	National Model "Horizon 5"
MANUFACTURER	National Co., Inc., 61 Sherman St., Malden 48, Mass.
TYPE SET	Four channel Pre-amplifier - Control unit designed to be used in conjunction with National Horizon 20 or National Criterion tuner
TUBES (Two)	Types 12AX7 Audio Amplifiers

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

NATIONAL
MODEL "Horizon 5"

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		NATIONAL PART No.	STANDARD REPLACEMENT		
V1	Pre-Amplifier	12AX7	12AX7	9A	
V2	AF Amplifier	12AX7	12AX7	9A	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

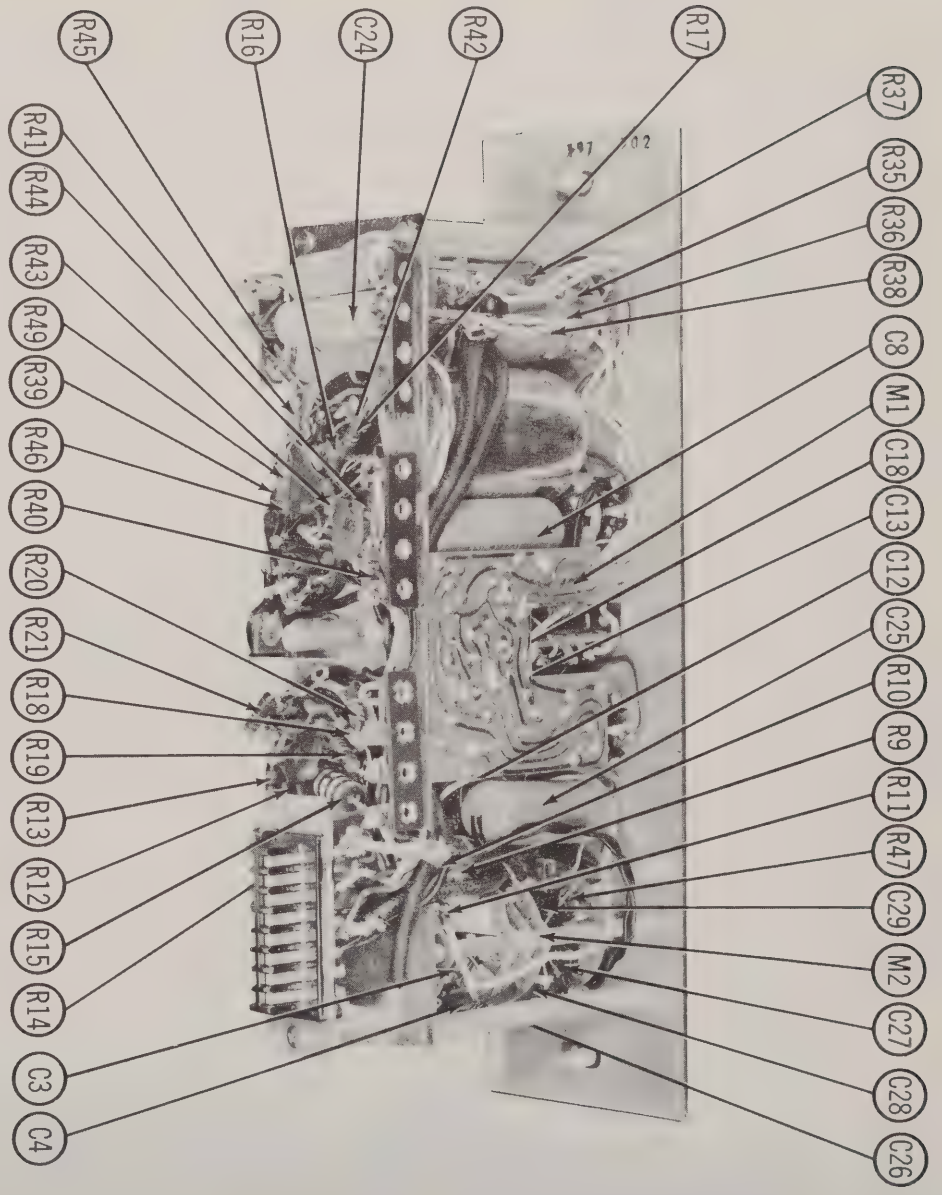
ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	NATIONAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	■40	300		AFH4-02		D002		FP420		
B	▲20	300								
C	▲40	300								
D	10	300								
C2	50	6		SRE10/50		BBR50-6			TVA-1100	
C3	820				D6-821	K067	811-821		5GA-T82	
C4	1500			BPD-0015	DD-152	K071	801-0015	DC-5215	5HK-D15	
C5	2200			BPD-0022	DD-222	K072	811-0022	UC-5222	5HK-D22	
C6	.047	200		P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C7	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C8	.5	200		P288-5		CUB2P5		PT405	2TM-P5	
C9	.015	200		P288-015		CUB6S15		PT6115	4TM-S15	
C10	.015	200		P288-015		CUB6S15		PT6115	4TM-S15	
C11	200			BPD-201	D6-201	G050	811-201	UC-532	5GA-T2	
C12	.047	200		P288-047	DF-503	CUB2S47		PT4147	2TM-S47	
C13	820				D6-821	K067	811-821		5GA-T82	
C14	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C15	2000			BPD-002	DD-202	K072	801-002	DC-522	5HK-D2	
C16	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C17	2000			BPD-002	DD-202	K072	801-002	DC-522	5HK-D2	
C18	200			BPD-201	D6-201	G050	811-201	UC-532	5GA-T2	
C19	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C20	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C21	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C22	10000			BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C23	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C24	.1	200		P288-1	DF-104	CUB2P1		PT401	2TM-P1	
C25	.5	200		P288-5		CUB2P5		PT405	2TM-P5	
C26	2500			SI2500	D6-252	K074		UC-5225	5HK-D25	
C27	20000				DF-203	K085	821-02		5HK-S2	
C28	1000			BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C29	2500			SI2500	D6-252	K074		UC-5225	5HK-D25	
C30	20000				DF-203	K085	821-02		5HK-S2	Note 1
C31	.02	600								Note 1

Note 1. Not used in some versions.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	NATIONAL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	2Meg	½	T014-1					Loudness & Switch - Tapped at 400KΩ & 130KΩ
B	2Meg	½						Loudness & Switch - Tapped at 20KΩ & 35KΩ
R2A	250KΩ	½	T013-3	Q18-130XX		ABT-155		Treble-Tapped at 110KΩ & 60KΩ
B	Shaft		Not Req.	Not Req.		AK-24		Attach to R2A
R3A	1Meg	½	T013-2	Q18-137XX		ABT-165		Bass-Tapped at 600KΩ & 350KΩ
B	Shaft		Not Req.	Not Req.		AK-24		Attach to R3A
R4A	500KΩ	½	T013-1	Q13-133	A47-500K-Z	AB-60	U-48	Input Level
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	500KΩ	½	T013-1	Q13-133	A47-500K-Z	AB-60	U-48	Input Level
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R5A

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

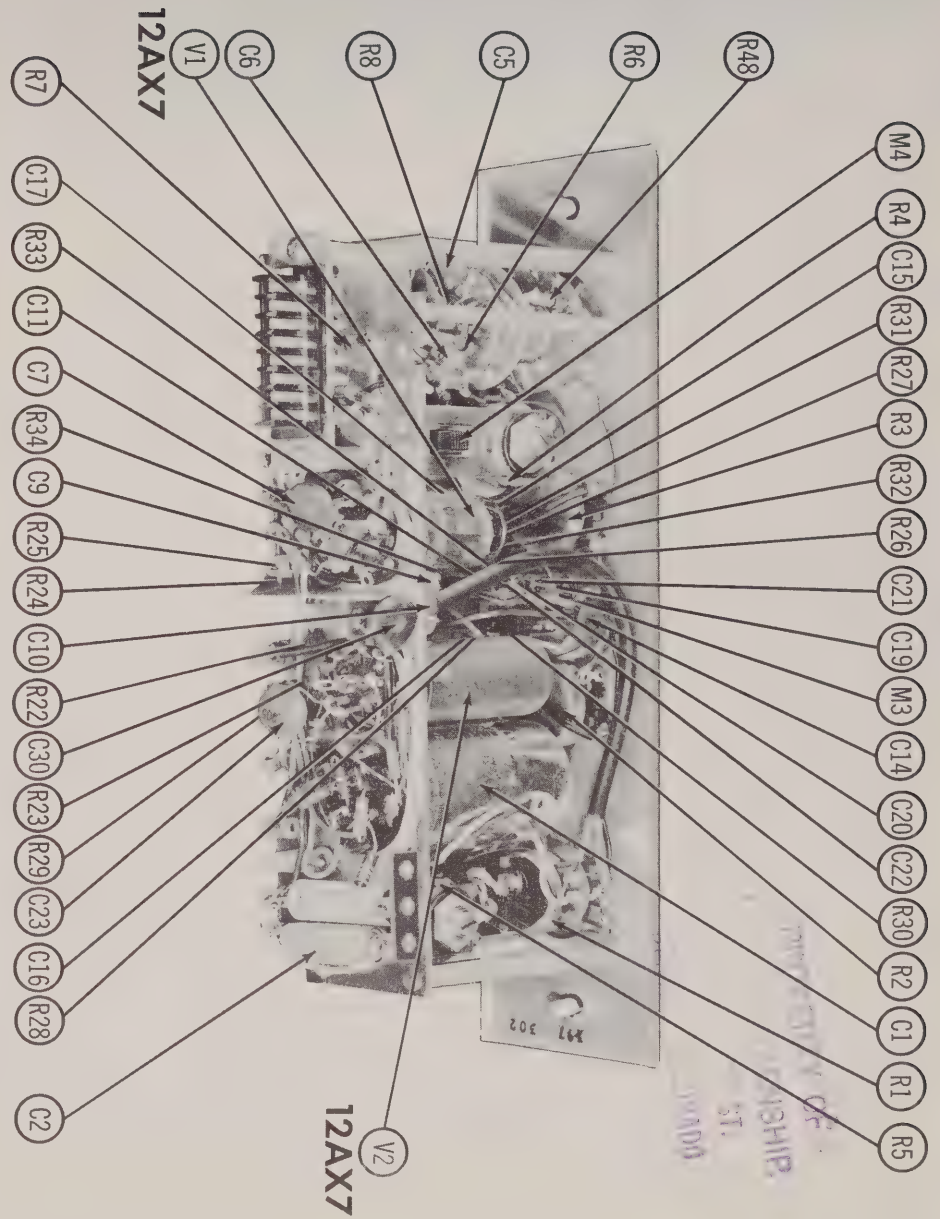
ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA NATIONAL PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R6	10KΩ	½		BTS-10K	Note 1
R7	220KΩ	½		BTS-220K	
R8	47KΩ	½		BTS-47K	
R9	6800Ω	½		BTS-6800	
R10	1000Ω	½		BTS-1000	
R11	150KΩ	½		BTS-150K	
R12	1Meg	½		BTS-1Meg	
R13	1000Ω	½		BTS-1000	
R14	3900Ω	½		BTS-3900	
R15	330KΩ	2		BTB-330K	
R16	22KΩ	½		BTS-22K	
R17	22KΩ	½		BTS-22K	
R18	1Meg	½		BTS-1Meg	
R19	680Ω	½		BTS-680	
R20	39KΩ	½		BTS-39K	
R21	220KΩ	½		BTS-220K	
R22	100KΩ	½		BTS-100K	
R23	100KΩ	½		BTS-100K	
R24	18KΩ	½		BTS-18K	
R25	22KΩ	½		BTS-22K	
R26	560KΩ	½		BTS-560K	
R27	15KΩ	½		BTS-15K	
R28	470KΩ	½		BTS-470K	
R29	560KΩ	½		BTS-560K	
R30	12KΩ	½		BTS-12K	
R31	15KΩ	½		BTS-15K	
R32	15KΩ	½		BTS-15K	
R33	330KΩ	½		BTS-330K	
R34	82KΩ	½		BTS-82K	
R35	39KΩ	½		BTS-39K	
R36	22KΩ	½		BTS-22K	
R37	39KΩ	½		BTS-39K	
R38	22KΩ	½		BTS-22K	
R39	3300Ω	½		BTS-3300	
R40	270KΩ	½		BTS-270K	
R41	47KΩ	½		BTS-47K	
R42	47KΩ	½		BTS-47K	
R43	1Meg	½		BTS-1Meg	
R44	820Ω	½		BTS-820	
R45	82KΩ	½		BTS-82K	
R46	120KΩ	½		BTS-120K	
R47	1. 8Meg	½		BTS-1. 8Meg	
R48	1Meg	½		BTS-1Meg	
R49	6. 8Meg	½		BTS-6. 8Meg	Note 2
R50	22Ω	½		BTS-22	Note 2

Note 1: Some versions may use a 5600Ω resistor in this application.
Note 2: Not used in some versions.

MISCELLANEOUS

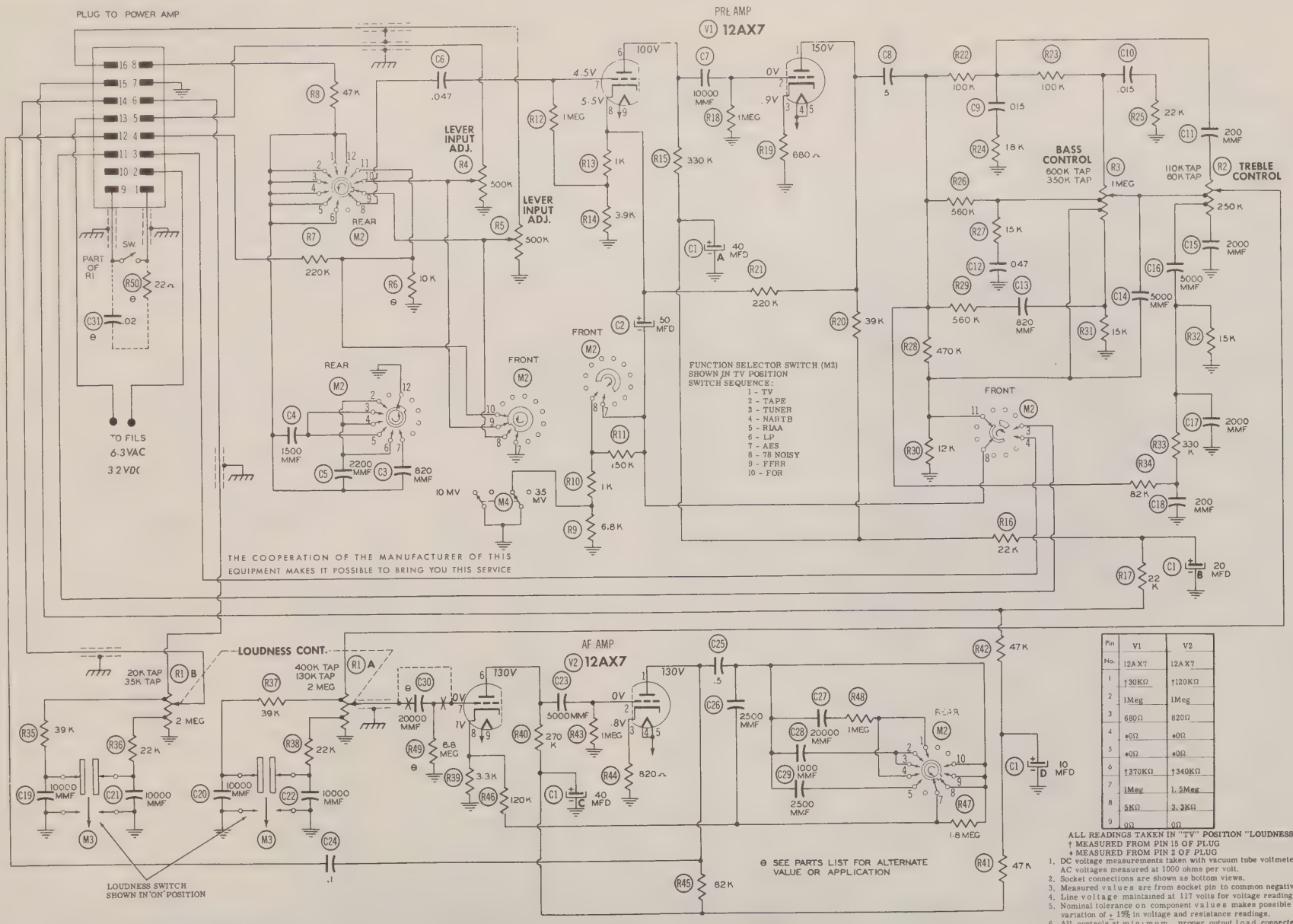
ITEM No.	PART NAME	NATIONAL PART No.	NOTES
M1	Printed Circuit	T018-1	
M2	Switch	T016-1	Selector & Record Equalization
M3	Switch	T015-1	Loudness
M4	Switch	T017-1	Phono Sensitivity
	Knob	SB:2819	4 used
	Knob	T678-1	Loudness Switch

CHASSIS—BOTTOM VIEW



NATIONAL
MODEL "Horizon 5"

NATIONAL
MODEL "Horizon 5"



Pin No.	V1 12AX7	V2 12AX7
1	†30KΩ	†120KΩ
2	1Meg	1Meg
3	680Ω	820Ω
4	♦0Ω	♦0Ω
5	♦0Ω	♦0Ω
6	†370KΩ	†340KΩ
7	1Meg	1.5Meg
8	5KΩ	3.3KΩ
9	0Ω	0Ω

ALL READINGS TAKEN IN "TV" POSITION "LOUDNESS" OFF
† MEASURED FROM PIN 15 OF PLUG
♦ MEASURED FROM PIN 2 OF PLUG

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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RCA VICTOR MODELS 4-C-671, 4-C-672 (Ch. RC-1142)

RCA VICTOR MODELS 4-C-671, 4-C-672 (Ch. RC-1142)

TRADE NAME	RCA Victor Models 4-C-671, 4-C-672 (Ch. RC-1142)
MANUFACTURER	RCA Victor Radio & "Victrola" Div., Radio Corp. Of America, Camden 2, N. J.
TYPE SET	AC Operated AM Superheterodyne Receiver With Electric Clock
TUBES (Six)	Types 12BA6 RF Amp., 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det-AVC-AF Amp, 35C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC - 60 Cycles
RATING	.25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC - 1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 7 (grid) of 12BE6 (V2). Low side to B-.	455KC (400~ Mod)	Point of non-interference near 600KC.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2		Loop	1620KC	Tuning gang fully open.	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	1400KC	Tune to 1400KC signal.	"	A6, A7	"
4		"	600KC	Tune to 600KC signal.	"	A8	Shunt A6 with 22KΩ, adjust for maximum output.
5		"	"	"	"	A9	Remove 22KΩ shunt, adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		RCA Victor PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	12BA6	12BA6	7BK	
V2	Converter	12BE6	12BE6	7CH	
V3	IF Amp.	12BA6	12BA6	7BK	
V4	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V5	Output	35C5	35C5	7CV	
V6	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	80	150	75980	PRS150/80-40		BBRD8415		TCD498	TVA-3451	
B	50	150								
C2	3.3		71503	SI3.3NP0	TCA-3.3	TZ06	NP0A-3R3	ZT-5533	5TCCB-V33	
C3	47		76348	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C4	2.2		71502	SI2.2NP0	TCZ-2.2	TZ05	NP0A-2R2		5TCCB-V22	
C5	.047	400	73553	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C6	47		76348	SI47	D6-470	TP29	GP1K-470	UC-5447	5GA-Q47	
C7	4.7		77471	SI4.7NP0	TCZ-4.7	TZ07	NP0A-4R7	ZT-5547	5TCCB-V47	
C8	.1	400	78922	P488-1	DF-104	CUB4P1		PT401	4TM-P1	
C9A	220									
B	5000									
C	5000		♦79058	♦PA-113-2	♦PC-151	♦116TM2	♦1408-02		♦DT-2	
D	250									
E										
C10	.015	400	79252	P488-015		CUB6S15		PT6115	4TM-S15	
C11	.047	400	75071	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C12	.1	400	73551	P488-1	DF-104	CUB4P1		PT4P1	4TM-P1	

♦ Items C9A, C9B, C9C, C9D, C9E, R8A, R8B and R8C are combined in one unit.
When replacing items seperately, C9D and C9E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	RCA Victor PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	79281	Q13-133	A47-500K-Z	B-59	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA Victor PART No.	IRC PART No.	
R2	180Ω	½	503118	BTS-180	
R3	8200Ω	½	503282	BTS-8200	
R4	33KΩ	½	503333	BTS-33K	
R5	120Ω	½	503112	BTS-120	
R6	2.2Meg	½	503522	BTS-2.2Meg	
R7	56KΩ	½	503356	BTS-56K	

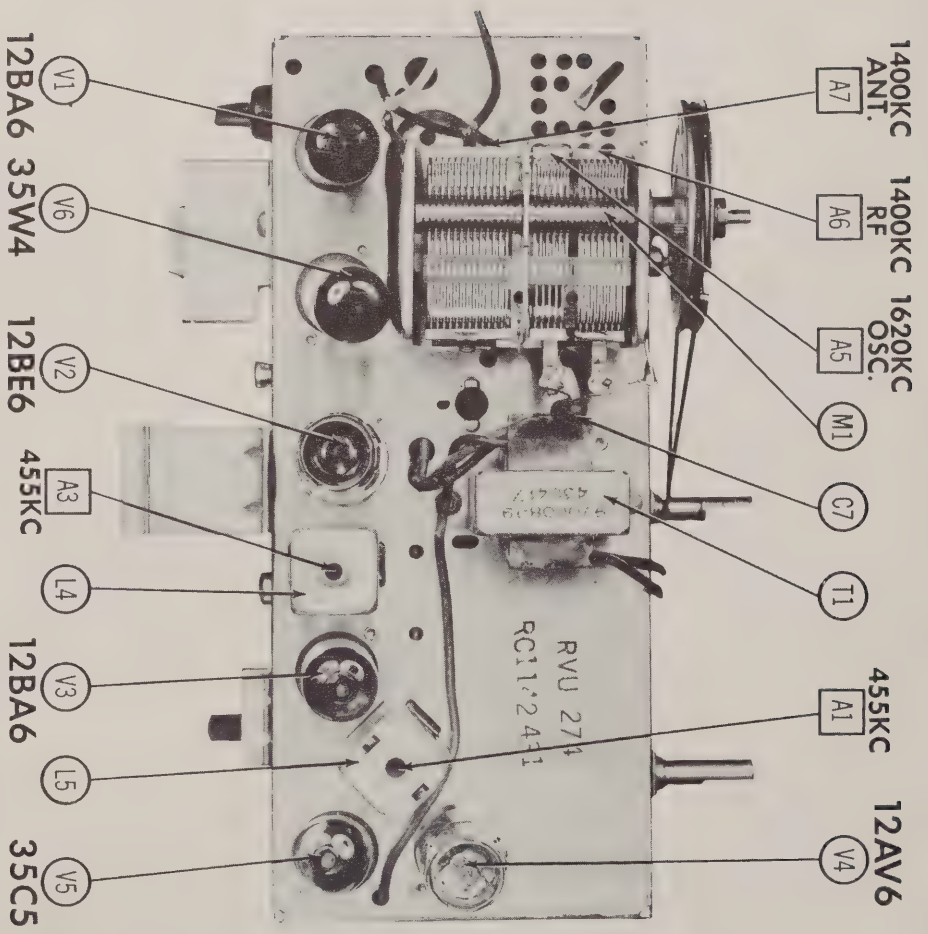
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA Victor PART No.	IRC PART No.	
R8A	6.8Meg	½	♦79058	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R9	150Ω	½	503315	BTS-150	
R10	1200Ω	1	513212	BTA-1200	
R11	33Ω	1	513033	BTA-33	

♦ Items R8A, R8B, R8C, C9A, C9B, C9C, C9D and C9E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	3KΩ	3.8Ω	77517	A-3336 ①	A-3031 ①		Z1102 ①	24S50A ①	① Drill one new mounting hole.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	RCA Victor PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.8Ω	77055	ST-113 Mod. P4-X	4A07	

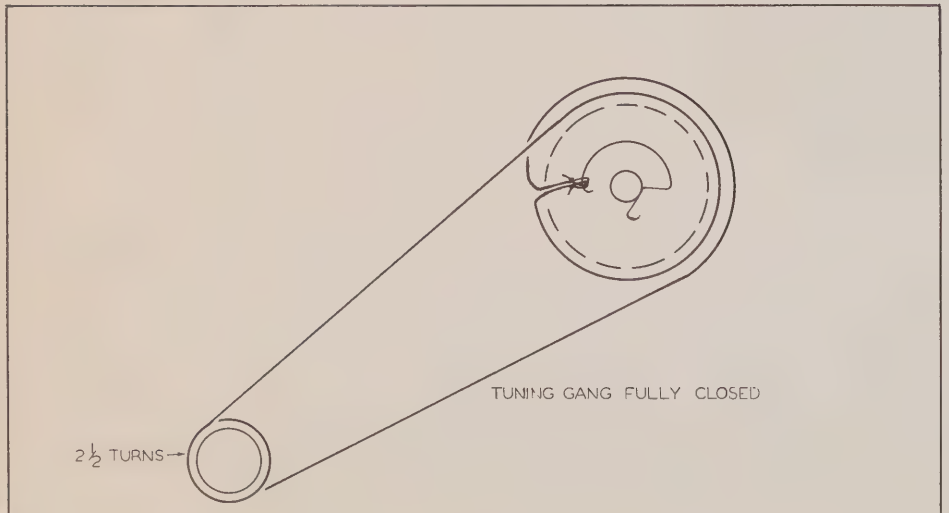
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	1.5Ω		79207				Includes cabinet back.
L2	RF Coil	33Ω	8Ω*	73677				
L3	Osc. Coil	.7Ω	7.5Ω	79284	14-1040		71-Osc.	
L4	Input IF	16Ω	16Ω	75486	16-6758	BC-352	12-C1	
L5	Output IF	15Ω	15Ω	73037	16-6770	BC-355	12-C6	

* Tapped at 3Ω.

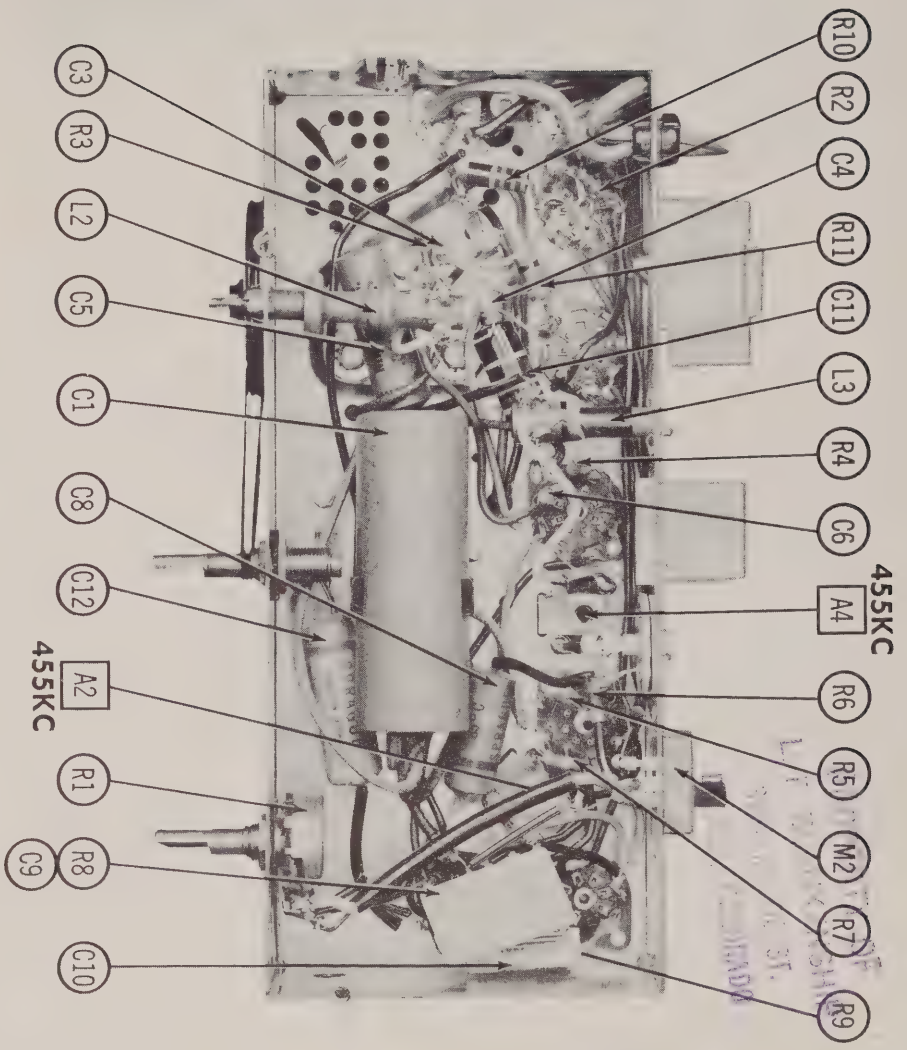
MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M1	Tuning Cap.	79310	23-415MMF; 15-235MMF; 10-100MMF.
M2	Switch	79256	Phono-Radio
	Cabinet	42642	Model 4-C-671
	Cabinet	42703	Model 4-C-672
	Knob	79300	Clock-Timer Control - Model 4-C-671
	Knob	79831	Clock-Timer Control - Model 4-C-672
	Knob	79305	Volume & Tuning - Model 4-C-671
	Knob	79832	Volume & Tuning - Model 4-C-672
	Dial	79306	
	Dial Pointer	79299	

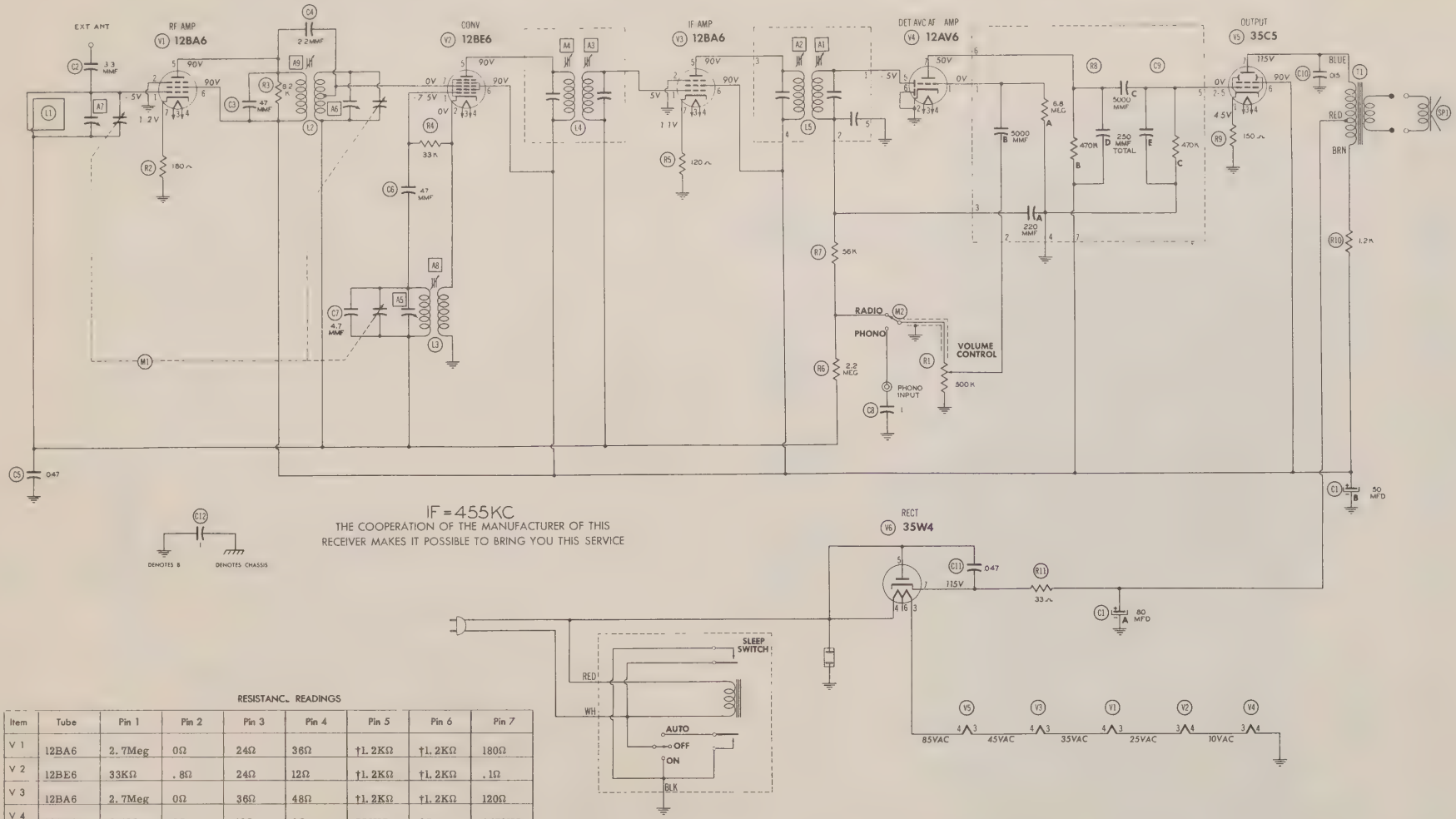


DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



RCA VICTOR MODEL 4-C-671 (Ch. RC-1142)



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BA6	2.7Meg	0Ω	24Ω	36Ω	†1.2KΩ	†1.2KΩ	180Ω
V 2	12BE6	33KΩ	.8Ω	24Ω	12Ω	†1.2KΩ	†1.2KΩ	.1Ω
V 3	12BA6	2.7Meg	0Ω	36Ω	48Ω	†1.2KΩ	†1.2KΩ	120Ω
V 4	12AV6	6.8Meg	0Ω	12Ω	0Ω	550KΩ	0Ω	†470KΩ
V 5	35C5	150Ω	470KΩ	48Ω	85Ω	470KΩ	†1.2KΩ	†290Ω
V 6	35W4	INF	INF	85Ω	120Ω	120Ω	110Ω	100KΩ

† MEASURED FROM PIN 7 OF V6.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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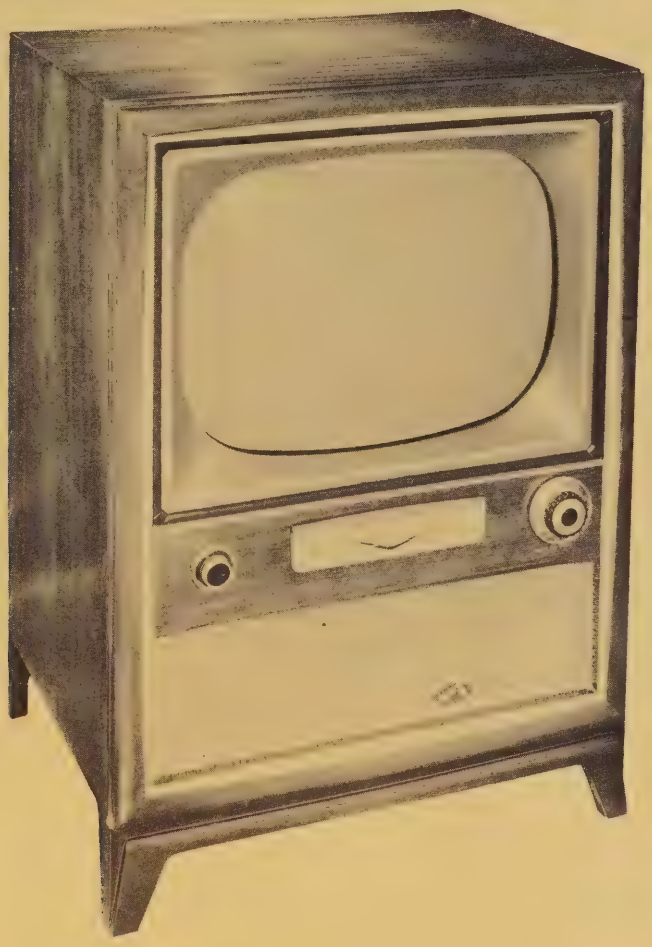

MODEL 21-D-527U

RCA VICTOR MODELS
21-D-527, U (Ch. KCS90, A)

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RCA VICTOR MODELS 21-D-527, U (Ch. KCS90, A)

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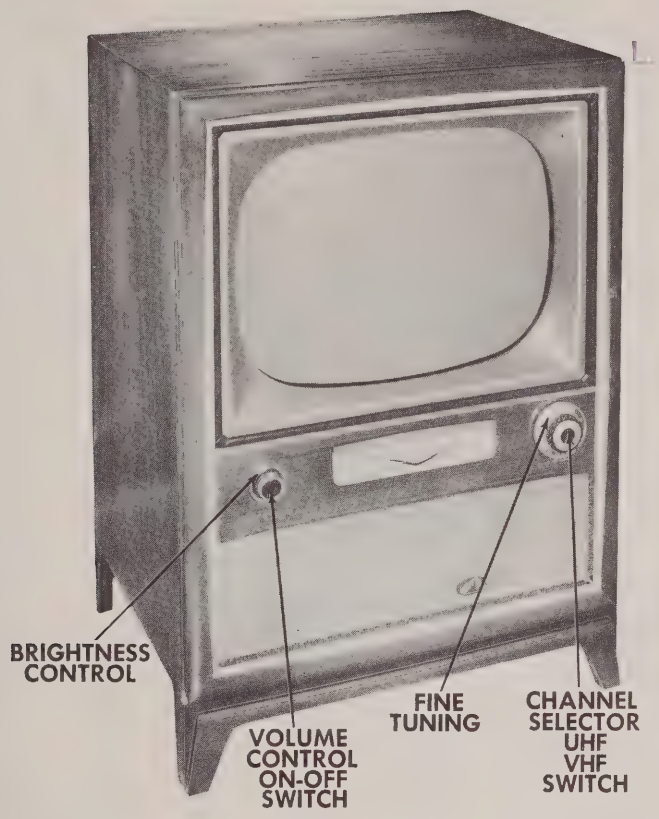

RCA VICTOR MODEL 21-D-527U

TRADE NAME	RCA Victor Models 21-D-527 (Ch. KCS90), 21-D-527U (Ch. KCS90A)
MANUFACTURER	Radio Corp. of America, RCA Victor Television Div., Camden 2, N. J.
TYPE SET	Television Receiver
TUBES	Twenty-four
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING 2.18 Amp. @ 117 Volts AC
TUNING RANGE—	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45. 75MC, Sound IF 41. 25MC (Intercarrier)

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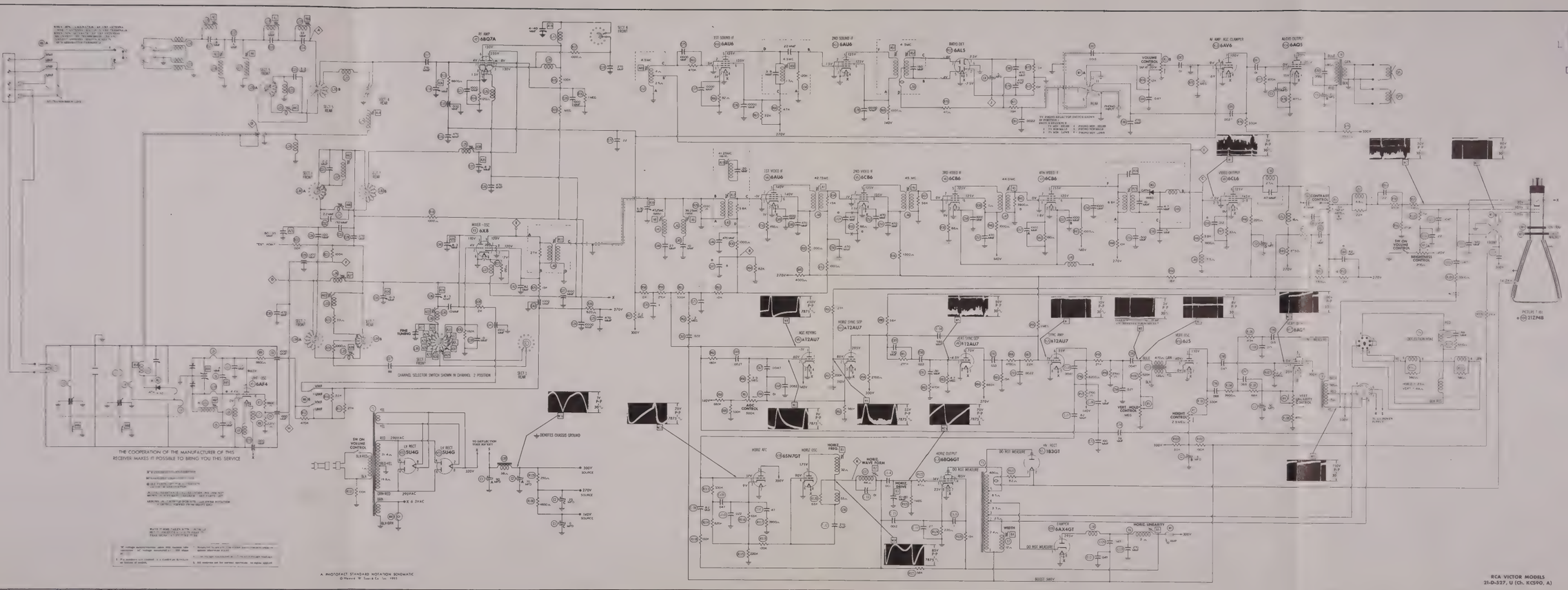
RCA VICTOR MODELS 21-D-527, U (Ch. KCS90, A)



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RCA VICTOR MODELS 21-D-527, U (Ch. KC590, A)

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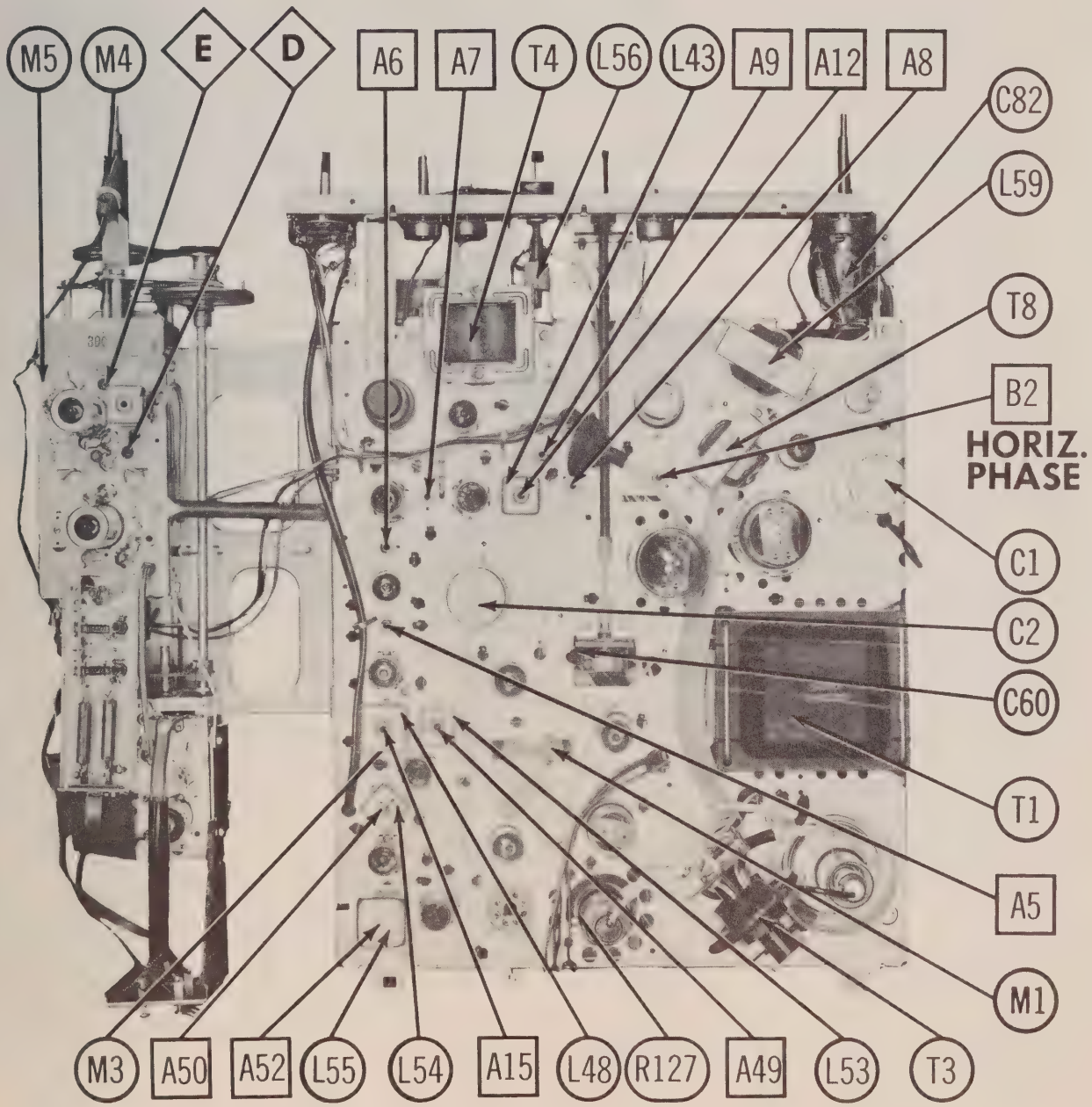
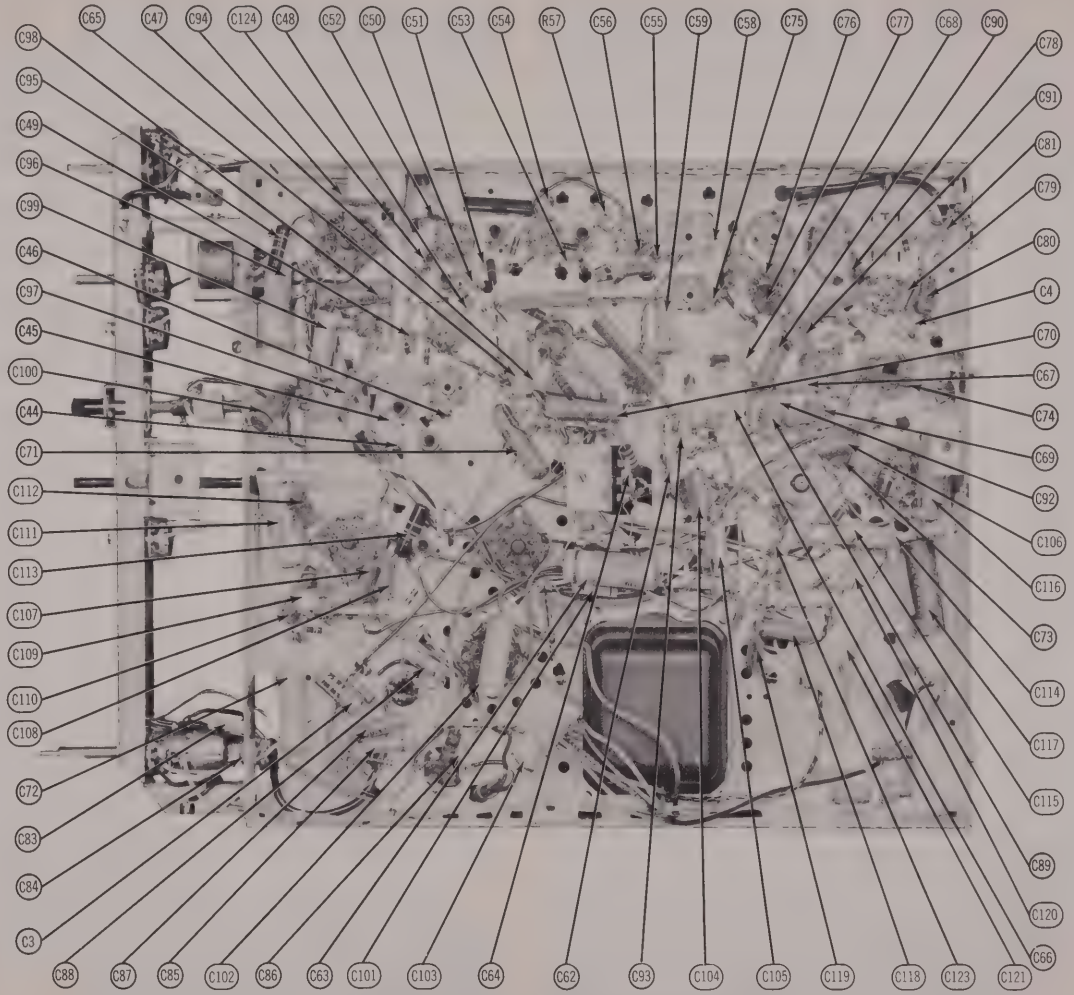


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be taped securely and kept away from chassis. Do not remove the horizontal oscillator tube (V18). Ml, located on top of the chassis, may be removed to eliminate high voltage during alignment.

KRK30B (or C) AND KRK22D ANTENNA MATCHING UNIT ALIGNMENT

The antenna matching unit has been properly aligned at the factory. The RF unit is aligned with a particular antenna matching unit in place. If a new antenna unit is installed, the RF unit should be realigned. Alignment should not be attempted without the proper alignment facilities. The FM trap which is located on the antenna matching unit may be adjusted without effecting the RF alignment. Disconnect the lead from the FM trap (L19) to the channel selector switch. Use a short jumper to connect point Ⓐ on the matching unit through a .001MFD capacitor to pin 1 (grid) of second video IF amplifier (V5). Remove the first video IF amplifier (V4) from its socket. Cover of matching unit must be in place during alignment. Connect the ends of a 1000Ω potentiometer across a 7.5 volt battery capable of withstanding considerable current drain. Connect the positive terminal to chassis and the potentiometer arm to point Ⓑ. Set the potentiometer arm to obtain -5 volts at this point.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	Not used	45.75MC (400∿Mod)	Any	Vert. Amp. to point Ⓒ. Low side to chassis.	A1	Set scope gain to maximum and adjust A1 for MINIMUM 400∿ indication on scope.
2.	"	"	"	41.25MC (400∿Mod)	"	"	A2	"
3.	"	"	50MC (20MC Swp)	50MC 52MC 53MC 60MC	"	Vert. Amp. thru detector probe (Fig.1) to point Ⓐ. Low side to chassis.	A3, A4	Remove the .001MFD capacitor (See instructions above) from point Ⓐ and connect a 300Ω, ½ watt carbon resistor from point Ⓐ to chassis. Adjust A3 and A4 to obtain response curve similar to Fig. 2. Repeat steps 1, 2 and 3 until no further improvement is noted. Remove the 300Ω resistor and the detector probe. Restore connection between L19 and the channel switch. Replace V4.

VIDEO IF ALIGNMENT FOR RECEIVERS USING VHF TUNER KRK22D

Turn the AGC control to its fully clockwise position.
Connect the bias supply as under "Antenna Matching Unit Alignment" and adjust for a -5 volts.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	.0015MFD Ceramic Capacitor	High side to terminal "A" of L19. Low side to chassis.	Not used	44.0MC	Any not being used locally	Use VTVM. DC probe to point Ⓒ. Common to chassis.	A5	Attenuate generator output to maintain not more than -3 volts on VTVM. Adjust for maximum deflection.
5.	"	"	"	45.0MC	"	"	A6	"
6.	"	"	"	42.75MC	"	"	A7	"
7.	"	"	"	47.25MC 41.25MC	"	"	A8, A13	Adjust for MINIMUM deflection.
8.	"	"	"	39.25MC	"	"	A9	"
9.	"	High side thru .0015MFD to point Ⓓ. Low side to chassis.	44MC (10MC Swp)	42.5MC 45.75MC 47.75MC	4	Vert. Amp. of scope thru detector (Fig.1) to pin 5 of (6AU6) V4. Low side to chassis.	A10, A11, A12	Preset A10 to MINIMUM capacity. Clip carbon 330Ω resistor across primaries (plate to screen) "A" and "B" of L46 and L47. Connect a 180Ω carbon resistor from plate. to screen of first video IF (V4). If a second signal generator is used for markers couple its output loosely to detector (Fig.1), adjust A11 and A12 for maximum gain with 47.75 MC at 75% response as in Fig.3. Attenuate generator output to maintain .3 volt peak to peak response on scope. Adjust A10 to place 42.5MC marker at 70% on response curve as in Fig. 3.
10.	"	"	"	42.5MC 45.0MC 45.75MC 46.5MC	4	Vert. Amp. to point Ⓒ. Low side to chassis.		Disconnect the 180Ω and the two 330Ω resistors. Attenuate generator output to maintain 3 volts peak to peak on scope. Retouch A5, A6, and A7 for response similar to Fig. 4. Adjust A15, and A16 as shown in step 13 for curve shape (Fig.5). Continue alignment with step 16.

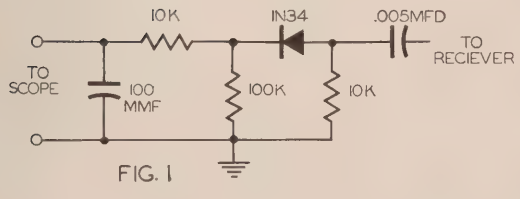

FIG. 1

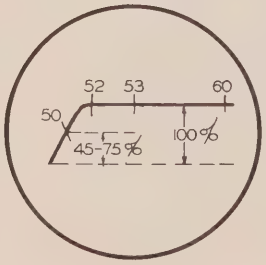

FIG. 2

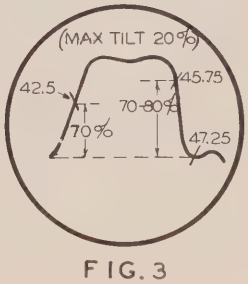

FIG. 3

RCA VICTOR MODELS
21-D-527, U (Ch. KCS90, A)

ALIGNMENT INSTRUCTIONS (cont)

KRK22D & KRK30C (VHF) TUNER ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
28.	Two 130Ω Carbon Resistors	Across antenna terminals with 130Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point Ⓓ. Low side to chassis.		Check for response similar to Fig. 6. Check oscillator injection voltage for each channel at point Ⓕ. If markers fall below 80% on any one channel, retouch A21, A34 and A35 to obtain response curves within proper limits.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
29.		Connect frequency meter as in step 17.	Not used	257MC	13	Not used	A22	Adjust individual channel oscillator slug for audible beat on each channel. Recheck oscillator injection voltage on each channel at point Ⓕ to verify that the voltage is within limits (2 volts minimum and 5.5 volts maximum).
				251MC	12		A23	
				245MC	11		A24	
				239MC	10		A25	
				233MC	9		A26	
				227MC	8		A27	
				221MC	7		A28	
				129MC	6		A29	
				123MC	5		230	
				113MC	4		A31	
				197MC	3		A32	
				101MC	2		A33	

UHF ALIGNMENT OF KRK30C TUNER UNIT

Turn the change-over switch to "UHF" position. The IF transformer (L43) should be grounded by inserting a clip lead through the aperature provided in the top of the tuner. Connect the other end of the clip lead to the tuner core. It will be necessary to fabricate a test dial to fit over the split gear on the tuner shaft for accurate alignment. Reference marks at 0, 9 and 168 degrees should be inscribed on the test dial. Locate the "0" degree point by inserting a shim between the stop pin on the tuner and the stop plate on the gear assembly with the capacitor plates fully meshed.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
30.	300Ω Pad as in Fig. 7.	Across UHF antenna terminals pad	887.5MC (20MC Swp)	887.5MC 41.25MC 43.5MC 45.75MC	83 (Rotate tuning dial to 168°)	Vert. Amp. to point Ⓖ. Low side to chassis.	A44, A45	Connect the high side of VHF signal generator thru 1000Ω carbon resistor to rear terminals of 1N82 crystal holder and insert markers for 41.25MC, 43.5MC and 45.75MC. Adjust for maximum response similar to Fig. 8.
31.	"	"	"	"	"	"	A46	Adjust until 43.5MC marker coincides with 887.5MC marker with the 41.25MC and 45.75MC markers symmetrically located on response curve as shown in Fig. 8.
32.	"	"	473.5MC	473.5MC 41.25MC 43.5MC 45.75MC	14	"	A47, A48, A54	Adjust A47, and A48 for maximum response similar to Fig. 9. Adjust A47 until 43.5MC markers coincide with 473.5MC marker with 41.25MC and 45.75MC markers as shown on response curve in Fig. 9.

33. Repeat steps 30, 31 and 32 until proper response is obtained. With perfect tracking the three markers will ride on top of the response curve. The markers may ride down the sides of the curve as far as 70% without effecting the alignment. If markers fall below 70% level, knifing of the RF plates become necessary to correct tracking. Two holes are provided on the left side of the tuner thru which the plates may be knifed. The plates should be knifed while tuning lower frequency. To avoid affecting the tracking above the point of knifing, a check of which section to knife may be made by touching the plates with the knifing tool while observing the response, then proceed to knife the proper section or both sections if required.

34. Connect the DC probe of a VTVM to point Ⓖ. Common to chassis. Set VTVM to 1.5 volts DC scale. Tune over entire range. Readings between .05 and .4 volts should be obtained. Voltages outside these limits indicate (A) Low B+ voltage. (B) Low or high 1N82 crystal impedance. (C) Oscillator tube outside allowance limits. Connect the DC probe to point Ⓗ (Tuner bias terminal.) Connect common to chassis. VTVM should read between 2.5 volts and .5 volts. Reading out of this range will cause currents outside allowable limits and in such cases replacement of the oscillator tube should follow. If the oscillator tube is replaced, recalibration of the high and low frequency end of the bands is required as outlined above.

SOUND IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
35.	.001MFD	High side to point I. Low side to chassis.	4.5MC (Unmod)	Any not used locally	DC probe to point Ⓙ. Common to chassis.	A49, A50, A51	Adjust for maximum deflection. Attenuate generator output so that A49, A50 and A51 peaks between 6 and 8 volts.
36.	"	"	"	"	"	A52	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Disconnect generator and VTVM from the set. Tune in a local TV station and note if any sound buzz is present. If noticed readjust A52 for MINIMUM buzz.

FM TRAP ADJUSTMENT

Tune in a local TV station in which interference is noticed, adjust A53 for MINIMUM interference in the picture.

4.5MC TRAP ALIGNMENT

L15 is the 4.5MC trap. This is located off of pin 6 of V8 and is a stationary part consisting of a coil wound around a 47MMF capacitor. If 4.5MC beat appears in picture, check L15 by replacing with a new one.

FREQ. CHART ON PAGE 21

RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	†▲20KΩ	9KΩ	0Ω	.1Ω	0Ω	9KΩ	†▲20KΩ		
V 2	6BQ7A	†2.1KΩ	†500KΩ	†600KΩ	0Ω	.1Ω	†600KΩ	550KΩ	120Ω	0Ω
V 3	6X8	0Ω	100KΩ	†13KΩ	.1Ω	0Ω	0Ω	100KΩ	†16KΩ	†16KΩ
V 4	6AU6	60KΩ	0Ω	0Ω	.1Ω	†5.3KΩ	†5.3KΩ	100Ω		
V 5	6CB6	60KΩ	68Ω	0Ω	.1Ω	†5.8KΩ	†5.8KΩ	0Ω		
V 6	6CB6	.2Ω	68Ω	.1Ω	0Ω	†6KΩ	†6KΩ	0Ω		
V 7	6CB6	.2Ω	180Ω	.1Ω	0Ω	†10.3KΩ	†6KΩ	0Ω		
V 8	6CL6	33Ω	3.9KΩ	†8.5KΩ	0Ω	.1Ω	†6KΩ	0Ω	†8.5KΩ	3.9KΩ
V 9	12AU7	300KΩ	†4.5Meg	†5KΩ	.1Ω	.1Ω	†680KΩ	4.7Meg	0Ω	0Ω
V 10	6AU6	470KΩ	0Ω	0Ω	.1Ω	†17KΩ	†17KΩ	82Ω		
V 11	6AU6	120KΩ	0Ω	0Ω	.1Ω	†6KΩ	†6KΩ	0Ω		
V 12	6AL5	10KΩ	10KΩ	.1Ω	0Ω	INF	0Ω	INF		
V 13	6AV6	10Meg	0Ω	0Ω	.1Ω	550KΩ	550KΩ	†330KΩ		
V 14	6AQ5	470KΩ	470Ω	0Ω	.1Ω	†1.5KΩ	†1KΩ	470KΩ		
V 15	12AU7	†2.7KΩ	†50KΩ	†370KΩ	.1Ω	.1Ω	†1KΩ	45KΩ	0Ω	0Ω
V 16	6J5	0Ω	0Ω	†1.6Meg	†1KΩ	1.4Meg	2.7KΩ	.1Ω	135Ω	
V 17	6AQ5	2.2Meg	1.2KΩ	0Ω	.1Ω	†600Ω	†40Ω	2.2Meg		
V 18	6SN7GT	1.5Meg	†40Ω	300KΩ	340KΩ	†56KΩ	0Ω	0Ω	.1Ω	
V 19	6BQ6GT	†40Ω	0Ω	INF	†15KΩ	1Meg	INF	.1Ω	220Ω	TOP CAP ●8.5Ω
V 20	6AX4GT	INF	INF	360KΩ	INF	†60Ω	INF	0Ω	.1Ω	
V 21	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			TOP CAP ●410Ω
V 22	5U4G	INF	30KΩ	INF	21Ω	INF	20Ω	INF	30KΩ	
V 23	5U4G	INF	30KΩ	INF	20Ω	INF	21Ω	INF	30KΩ	
V 24	21ZP4B	0Ω	†60KΩ	Pin 10 ●270KΩ	Pin 11 †220KΩ	Pin 12 .1Ω				

† MEASURED FROM PIN 8 OF V22.
▲ MEASURED IN "UHF" POSITION.
● MEASURED FROM PIN 3 OF V20.

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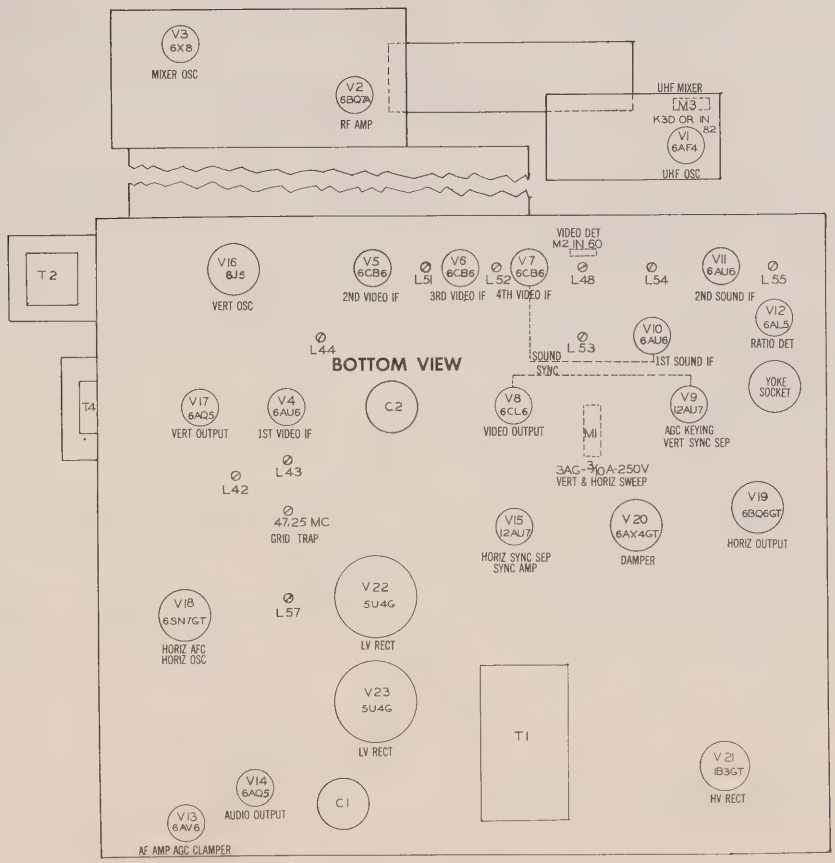
3924 MEADE ST.
DENVER, COLORADO



TUBE PLACEMENT CHART

SET 269 FOLDER 12

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V18, V19, V20, V22 and V23. Check adjustments B3, B4 and B5. Check T3, T5A, C114, R125 and other associated components.

DRIVE LINES

Check by substitution V19 and V20. Check adjustments B3 and B5. Check C114, C117, R125, T3, T5A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V19 and V20. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V18 and V19. Check C109, C110, C111, R115, R117, L56 and other associated components.

XMAS TREE EFFECT

Check by substitution V18, V19 and V20. Check T3 and T5 for internal arcing. Check L56, L57, R119, R114, C112, C113, C114 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V16 and V17. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T3, T4B, C1D, R108, R4 and other associated components.	Check T2, R102, R101, R2, C96, C98 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V16 and V17. Check height and vertical linearity controls for proper operation. Check T4, T5B, R101, R102 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V16 and V17. Check R102, R101, R2, C98 and other associated components.

COMPRESSED AT TOP

Check by substitution V16 and V17. Check C1D, R108, R4 and other associated components.

FOLDS

Check by substitution V16 and V17. Check C96, C97, C98, R104, R105, T4 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V9 and V15. Check C89, C104, R84, R80, R94, R96, R97 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V16. Check T2, C95, R100, R5 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V18. Check C104, C112, R119, L56, L57 and other associated components.

HORIZONTAL BENDING

Check by substitution V9, V15 and V18. Check components associated with V18.

VIDEO

LOSS OF VIDEO

Substitute V8. Check R48, R49, R55, C63, C2D, L51 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check video IF alignment.

POOR CONTRAST

Substitute V8. Check contrast control. Check video crystal detector. Check C63, R54, R55, L52, L49 and other associated components.

NEGATIVE PICTURE

Substitute V8. Check picture tube. Check video crystal detector. Check L50, R47, C59 and other associated components.

SMEAR

Substitute V8. Check L49, L50, L52, C63, R54 and R55. Check video IF alignment.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V2, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12, V13 and V14. Check stages V13 and V14 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C82, C83, C87, C88, C1B, R79, R76, R78, T8, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A52. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

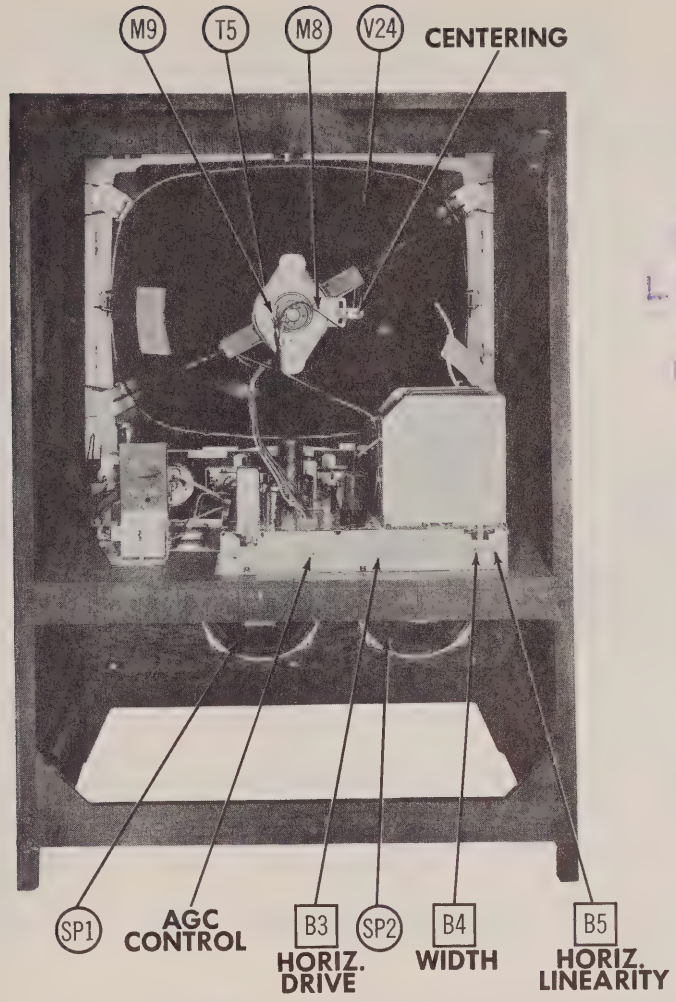
POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check by substitution V22 and V23. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check by substitution V22 and V23. Check B+ filter and decoupling network.



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CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern. If the picture cannot be synchronized horizontally, adjust horizontal frequency slug (B1) until the picture will synchronize. If picture still will not synchronize, adjust the horizontal waveform slug (B2) several turns out of the coil and readjust B1 to synchronize the picture; keeping in mind at all times horizontal oscillator tube is good. If picture width or linearity is incorrect, adjust the horizontal drive (B3), the width slug (B4) and the horizontal linearity slug B5 for proper results.

HORIZONTAL WAVEFORM ADJUSTMENTS

The horizontal waveform adjustment is adjusted at factory and normally will require no readjustment. If L56 or L57 is replaced in the set, scope adjustment will become necessary to synchronize the picture. Short out B2 with clip leads and turn B1 slug all the way out. Rotate B1 slug back in until picture locks in sync. Remove short from B2. Connect the low capacity probe of an oscilloscope to terminal point ⓚ on schematic. Low side to chassis. Adjust B2 until the waveform on scope appears as in Fig. 10.

AGC CONTROL ADJUSTMENT

Connect the vertical amplifier of an oscilloscope to pin 6 of V8. Connect low side to chassis. Turn AGC control fully counter clockwise. Tune in a strong TV signal and adjust the scope to see the video waveform. Turn the AGC control clockwise until sync tips begin to be compressed, then back counter clockwise just enough to remove compression. If the control is set too far clockwise on a weak signal, the receiver may overload when a strong signal is received.

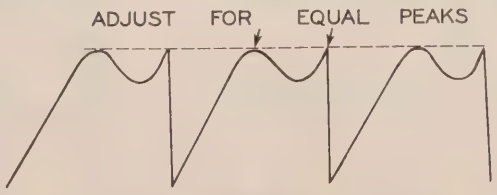
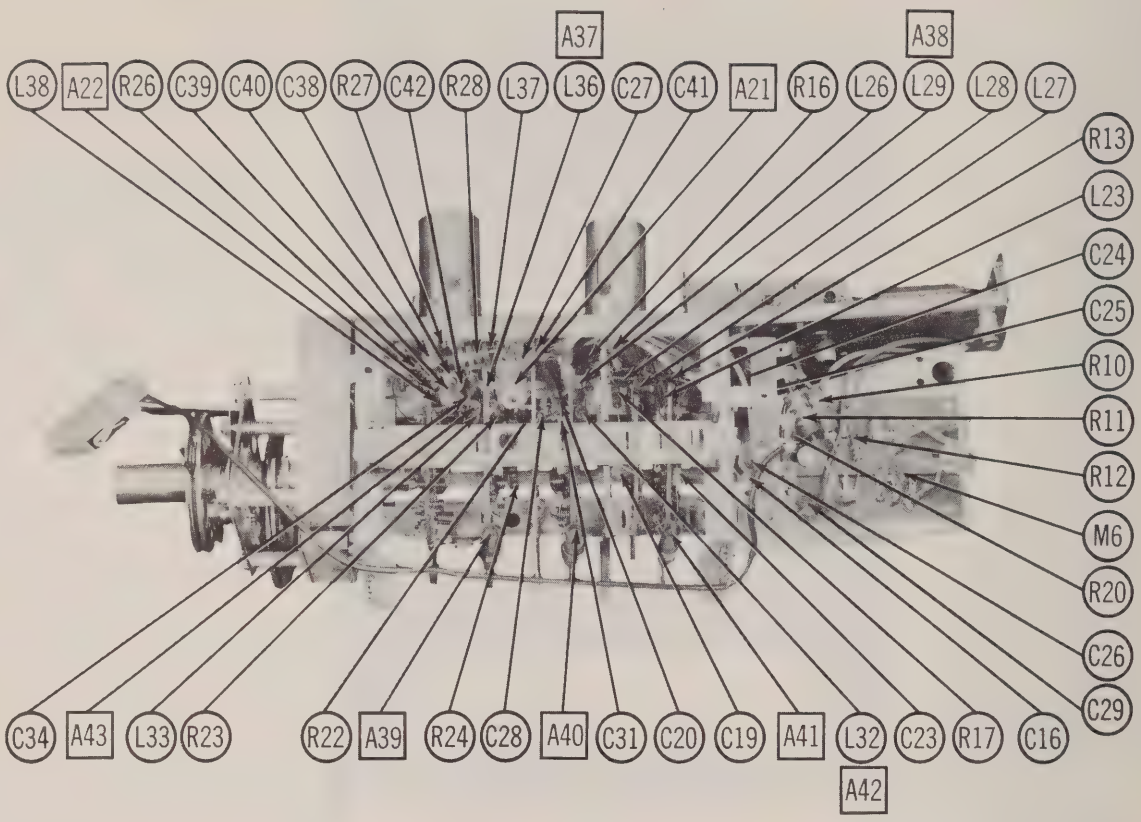
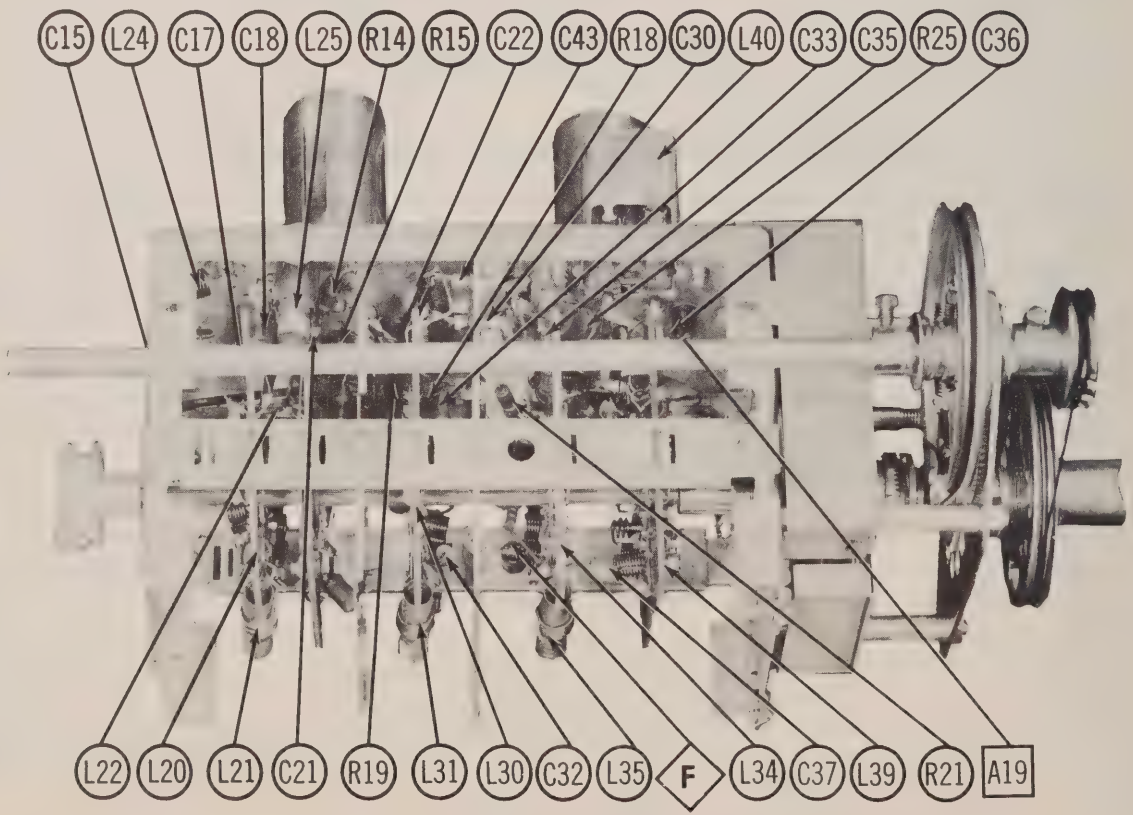


FIG. 10



VHF TUNER-RIGHT SIDE



VHF TUNER-LEFT SIDE

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: RCA Victor PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	UHF Osc.	6AF4	6AF4	7DK	
V2	RF Amp.	6BQ7A	6BQ7A	9AJ	
V3	Mixer-Osc.	6X8	6X8	9AK	
V4	1st Video IF Amp.	6AU6	6AU6	7BK	
V5	2nd Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd Video IF Amp.	6CB6	6CB6	7CM	
V7	4th Video IF Amp.	6CB6	6CB6	7CM	
V8	Video Output	6CL6	6CL6	9BV	
V9	AGC Keying-Vert. Sync Sep.	12AU7	12AU7	9A	
V10	1st Sound IF Amp.	6AU6	6AU6	7BK	
V11	2nd Sound IF Amp.	6AU6	6AU6	7BK	
V12	Ratio Det.	6AL5	6AL5	6BT	
V13	AF Amp-AGC Clamper	6AV6	6AV6	7BT	
V14	Audio Output	6AQ5	6AQ5	7BZ	
V15	Horiz. Sync Sep-Sync Amp.	12AU7	12AU7	9A	
V16	Vert. Osc.	6J5	6J5	6Q	
V17	Vert. Output	6AQ5	6AQ5	7BZ	
V18	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V19	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V20	Damper	6AX4GT	6AX4GT	4CG	
V21	HV Rectifier	1B3GT	1B3GT	3C	
V22	LV Rectifier	5U4G	5U4G	5T	
V23	LV Rectifier	5U4G	5U4G	5T	

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: RCA Victor PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.	RETMA BASE TYPE	NOTES
V24	21ZP4B ①	21ZP4B ① 21ZP4A	21ZP4B ① 21ZP4A	21ZP4B ① 21ZP4A 21ZP4 ②	21ZP4B ① 21ZP4A	12N 12N 12D	① Aluminized ② Circuit changes necessary

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▰90	400	79391	AFH4-07 PRS50/50		D121 BR505			TVL-4680 TVA-1308	
B	■20	400								
C	▲10	400								
D	50	50								
C2A	■70	400	79392	AFH4-18-75		D123 BR445		FP449 TC74	TVL-4780 TVA-1702	
B	▰5	450								
C	▲25	400								
D	5	400								
C3	20	25	79380	PRS25/20		BR202		TC26	TVA-1205	
C4	5	50	74521	PRS150/4		BR550		TC30	TVA-1303	
C5	1.0		79560	SI1NP0	TCZ-1	TZ03	NP0A-010		5TCCB-V1	
C6	1-4		79556		829-4		3115-01-10	CT551		
C7	1.0		79560	SI1NP0	TCZ-1	TZ03	NP0A-010		5TCCB-V1	
C8	1000		79559	EF-001	MFT-1000				503C-D1	
C9	1000		79559	EF-001	MFT-1000				503C-D1	
C10	1000		79559	EF-001	MFT-1000				503C-D1	
C11	18			SI18NP0	TCZ-18	TZ12	NP0K-180			
C12	5			SI5NP0	TCZ-4.7	TZ07	NP0K-050	ZT-555	5TCUB-V5	
C13	27			SI27NP0	TCZ-27	TZ16	NP0K-270			
C14	33			SI33NP0	TCZ-33	TZ18	NP0K-330	ZT-5433	5TCC-Q33	
C15	1000		77084	EF-001	MFT-1000				503C-D1	
C16	470		77293	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C17	270		75199	SI270	D6-271	TP41	GP1K-271	UC-5327	5GA-T27	
C18	1-4		76532		829-4		3115-01-10	CT551		
C19	270		75199	SI270	D6-271	TP41	GP1K-271	UC-5327	5GA-T27	
C20	1000		77252	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C21	1000		77252	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C22	.8-3		77151		829-3		3115-01-0R5	CT565A		
C23	3.3		71503	SI3.3NP0	TCZ-3.3	TZ06	NP0K-3R3	ZT-5533	5TCCB-V33	
C24	10000		73960	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C25	470		77293	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C26	470		77293	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C27	1000		77084	EF-001	MFT-1000				503C-D1	
C28	270		71599	SI270	D6-271	TP41	GP1K-271	UC-5327	5GA-T27	
C29	1000			EF-001	MFT-1000				503C-D1	
C30	470			BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C31	2.2			SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C32	2.2			SI2.2NP0	TCZ-2.2	TZ05	NP0K-2R2		5TCCB-V22	
C33	150		78276	SI150	D6-151	TP36	GP1K-151	UC-5315	5GA-T15	
C34	100		75437	SI100	D6-101	TP34	GP1K-101	UC-531	5GA-T1	
C35	.8-3		77193		829-3		3115-01-0R5	CT565A		
C36	.8-3		77193		829-3		3115-01-0R5	CT565A		
C37	.68		71504		TCZ-.68	TZ02				
C38	10		78247	SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C39	10		77865	SI10NP0	TCZ-10	TZ09	NP0K-100	ZT-541	5TCC-Q1	
C40	.8-3		77151		829-3		3115-01-0R5	CT565A		
C41	1000		77084	EF-001	MFT-1000				503C-D1	
C42	82		78603							
C43	1000		77084	EF-001	MFT-1000				503C-D1	
C44	27		79488	SI27	D6-270	TP26	GP1K-270	UC-5427	5GA-Q27	
C45	10		53511	SI10	D6-100	TP09	GP1K-100	UC-5410	5GA-Q10	
C46	470		77293	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C47	.18	200								Note 1
C48	470		78622	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C49	1000		73960	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C50	470		77293	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C51	470		77293	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C52	470		77293	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	

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CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA: RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C83	470		77293	BPD-00047	DD-471	G060	801-00047	UC-5347	5GA-T47	
C84	1000		73060	BPD-001	DD-102	K069	801-061	DC-521	5HK-D1	
C85	1500		75168				325-152		50MC-D15	
C86	1000		78623	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C87A	1000		97947	BPD-23001	DD3-103	DK069	S12-001	DCD-521	5HK-3D1	
B	1000									
C88	15		30044							
C89	.012	400		P488-012		CUB4S12		PT412	47M-S12	Note 2
C90	47		30042							Note 3
C91	15		30044							
C92	15		33380							
C93	.22	600	73794	P488-22		CUB4P22		PT4022	47M-P22	
C94	82									Note 3
C95	.022	600	73798	P688-022		CUB6S22		PT6122	67M-S22	
C96	.01	400	73581							
C97	.0047	400	73302							
C98	.0082	400	79019							
C99	.0027	600	78599	P688-0027		CUB6D27		PT6237	67M-D27	
C70	.1	300	73784	P288-1	DF-104	P2P1		PT401	37M-P1	
C71	.1	200	73784	P288-1	DF-104	P2P1		PT401	37M-P1	
C72	.22	200	78995	P288-22		P2P22		PT4022	37M-P22	
C73	100	1500	76578	1647-0001						
C74	39	3500	76574							
C75	10000		73960	BPD-01	DD-103	K082	81L-01	DC-5U	5HK-S1	
C76	10000		73960	BPD-01	DD-103	K082	81L-01	DC-5U	5HK-S1	
C77	10000		73960	BPD-01	DD-103	K082	81L-01	DC-5U	5HK-S1	
C78	10000		73960	BPD-01	DD-103	K082	81L-01	DC-5U	5HK-S1	
C79	470	500	39644	1468-471		5W5T47		MC245	1FM-S5	
C80	470	500	39644	1468-471		5W5T47		MC245	1FM-S5	
C81	.0033	600	73596	P688-0033	D6-332	CUB6D33	GP3-333-222	PT6233	67M-D22	
C82	.0015	400	78606	P488-0015	D6-152	CUB4D15	GP2L-152	PT4215	67M-D15	
C83	.01	400	73561	P488-01	D6-103	CUB4S1	GP3-333-103	PT411	47M-S1	
C84	.047	200	73558							
C85	.0027	600	73599	P688-0027	D6-272	CUB6D27	GP3-333-272	PT6227	67M-D27	
C86	270		47617	83X70	D6-271	TP41	GP2L-271	UC-5327	5GA-T27	
C87	.01	400	73561	P488-01	D6-103	CUB4S1	GP3-333-103	PT411	47M-S1	
C88	.0022	1000	73595							
C89	330	500	39640	1468-331				MC236	1FM-S3	
C90	.022	600	73563	P488-022		CUB4S22		PT4122	47M-S22	
C91	150	500	39633	1468-151		5W5T15		MC336	1FM-S15	
C92	.033	400	73553							
C93	.0022	600	78595							
C94	.027	400	73554							
C95	.0047	400	73603							
C96	.068	600	79543							
C97	.068	200	73792							
C98	.047	600	73592	P688-047	DF-503	CUB6S47		PT6147	67M-S47	
C99	.015	1000	73909	P1068-015		CUB6S15		PT6215	MB-S15	
C100	.001	1000	79260	P1068-001		CUB6S1		PT6201	MB-D1	
C101	.0047	400	79017	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	67M-D47	
C102	.047	600	73592	P688-047	DF-503	CUB4S47		PT4147	67M-S47	
C103	.22	400	73794	P488-22		CUB4P22		PT4022	47M-P22	
C104	560	1000	74250							
C105	.0047	400	79017	P488-0047	D6-472	CUB4D47	GP2-333-472	PT4247	67M-D47	
C106	5	1500	73809							
C107	82	1000	76474							
C108	82	1000	76474							
C109	.047	400	73553	P488-047	DF-503	CUB4S47		PT4147	47M-S47	
C110	.022	400	73563	P488-022		CUB4S22		PT4122	47M-S22	
C111	.47	200	79797	P288-47		P2P47		PT4047	37M-P47	
C112	270	1000	76579							
C113	.01	600	73594							
C114	.001	1000	75643	P1068-001		CUB6D1		PT6201	MB-D1	
C115	.0012	600	78595							
C116	.1	600	78597	P688-1	DF-104	CUB6P1		PT601	67M-P1	
C117	.27	200	73786	P288-27		P2P27		PT4027	37M-P27	
C118	.01	400	73561	P488-01	D6-103	CUB4S1	GP3-333-103	PT411	47M-S1	
C119	270	1000	79023							
C120	.047	1000	73597	P1068-047		CUB6S47		PT6147	MB-S47	
C121	.047	1000	73597	P1068-047		CUB6S47		PT6147	MB-S47	
C122	56									
C123	1000		73743	BPD-0015	DD-152	K071	801-0015	DC-152	5HK-D15	
C124	470			BPD-00047	DD-470	G060	801-00047	UC-5347	5GA-T47	Note 3

Note 1. Some versions may use a .22MFD ⑤ 300V in this application.
Note 2. Some versions may use a .082MFD ⑤ 400V in this application.
Note 3. Not used in some versions.

CONTROLS

ITEM No	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: RCA Victor PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	200KΩ	½	*QJ-498	RTV-498			UJ254L	Brightness-Panel
B	1MEG	½					UR16-T35	Volume Tapped at 200KΩ-rear
C	Switch						UB-37	Attach to R1B
R2A	2.5MEG	½	T8907	BU-239	A47-2.5Meg-S	AB-23	SU-565	Height
B	Shaft		Not Req.	TM-2KIT	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3	15KΩ	½	76445	Q13-15KXX				Contrast Tapped at 4875Ω & 10KΩ
			T8908†					
R4A	1500Ω	½	T9491	Q11-109	A47-1500-S	AB-8	U-6	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	1MEG	½	T8304	Q11-137	A47-1Meg-S	AB-89	U-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R5A
R6A	500KΩ	½	T8908	BU-123	A47-500K-S	AB-89	SU-80	AGC
B	Shaft		Not Req.	TM-2KIT	FKS-1/4	AK-1	Not Req.	Attach to R6A

* CONCENTRIKIT EQUIVALENT: KIT K-3, BASE ELEMENTS & SHAFTS: BU-139 & P1-200 (PANEL)
BU-137X & R1-216 (REAR)
76-2 SWITCH

† Contrast control shaft.

PARTS LIST & DESCRIPTION (continued)

RESISTORS

ITEM No	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: RCA Victor PART No.	IRC PART No.	NOTES
R7	6800Ω	1		BTS-6800	
R8	2200Ω	1		BTS-2200	
R9	680Ω	1		BTA-680	
R10	22KΩ	2		BTD-22K	
R11	47KΩ	2		BTD-47K	
R12	470KΩ	½		BTS-470K	
R13	6800Ω	½	502288	BTS-6800	
R14	1200	½	502118	BTS-120	
R15	100KΩ	½	502410	BTS-100K	
R16	1Meg	½	502310	BTS-1Meg	
R17	1000Ω	½	502310	BTS-1000	
R18	1000Ω	½	502310	BTS-1000	
R19	1Meg	½	502310	BTS-1Meg	
R20	820Ω	½	503182	BTS-820	
R21	100KΩ	½	502410	BTS-100K	
R22	100KΩ	½	502410	BTS-100K	
R23	33Ω	½	502033	BTS-33	
R24	3300Ω	½	502333	BTS-3300	
R25	15KΩ	3	532315	BTS-15K	
R26	100KΩ	½	502410	BTS-100K	
R27	120Ω	½	502118	BTS-120	
R28	12KΩ	2	532312	BTS-12K	
R29	1MEG	½	502310	BTS-1000	
R30	1000Ω	½	502310	BTS-1000	
R31	1000 5%	½	502110	BTS-100 5%	
R32	1000Ω	½	502310	BTS-1000	
R33	1000Ω	½	502210	BTS-1000	
R34	15KΩ 5%	½	36714	BTS-15K 5%	
R35	68Ω 5%	½		BTS-68 5%	Note 1
R36	1500Ω	½		BTA-1500	
R37	56KΩ 5%	½	503356	BTS-56K 5%	
R38	68Ω 5%	½	503068	BTS-68 5%	
R39	10Ω	½	502310	BTS-10	
R40	1000Ω	½	502310	BTS-1000	
R41	3900Ω 5%	½	502347	BTS-3900 5%	Note 2
R42	180Ω 5%	½	503118	BTS-180 5%	
R43	1000Ω	½	502310	BTS-1000	
R44	10KΩ	2	532310	BTS-10K	
R45	4700Ω	7	77958	PW7-4700	
R46	3900Ω 5%	½	502339	BTS-3900 5%	
R47	33Ω	½	503033	BTS-33	
R48	220Ω	½	504123	BTS-220	
R49	6750Ω	10	76643		
R50	18KΩ	½	513318	BTA-18K	
R51	22KΩ	½	503323	BTS-22K	
R52	3300Ω	½		BTS-3300	Note 3
R53	2.2MEG	2		BTS-12K	Note 3
R54	330KΩ	½	503433	BTS-330K	
R55	1000Ω	½	504310	BTS-1000	
R56	470KΩ	½	503447	BTS-470K	
R57	2.2Meg 5%	½	513522	BTA-2.2Meg 5%	
R58	10KΩ	½	503310	BTS-10K	
R59	270KΩ 5%	½	503437	BTS-270K 5%	
R60	180KΩ	½	503418	BTS-180K	
R61	300KΩ 5%	½		BTS-300K 5%	
R62	1.5Meg	½	503512	BTS-1.5Meg	
R63	10KΩ	½	503310	BTS-10K	
R64	82KΩ 5%	½	503382	BTS-82K 5%	
R65	470KΩ	½	504447	BTS-470K	
R66	82Ω	½	503082	BTS-82	
R67	22KΩ	2	532323	BTS-22K	
R68	47KΩ	½	514347	BTA-47K	
R69	1000Ω	½	502310	BTS-1000	
R70	47Ω	½	503047	BTS-47	
R71	39KΩ	½	503339	BTS-39K	
R72	10KΩ 5%	½	502310	BTS-10K 5%	
R73	10KΩ 5%	½	502310	BTS-10K 5%	
R74	12KΩ	½	503312	BTS-12K	
R75	1MEG	½	504610	BTS-10Meg	
R76	330KΩ	½	504433	BTS-330K	
R77	470KΩ	½	504447	BTS-470K	
R78	470Ω	1	513147	BTA-470	
R79	1000Ω	2	522310	BTD-1000	
R80	56KΩ	½	503356	BTS-56K	
R81	270KΩ	½	503427	BTS-270K	
R82	470KΩ	½		BTS-470K	
R83	4.7Meg	½	503547	BTS-4.7Meg	
R84	680KΩ	½	503468	BTS-680K	
R85	15KΩ	½	36714	BTS-15K	
R86	4700Ω	½	503247	BTS-4700	
R87	22KΩ	½		BTS-22K	
R88	680KΩ	½	502468	BTS-680K	
R89	330KΩ	½	503433	BTS-330K	
R90	3.9Meg	½	503539	BTS-3.9Meg	
R91	27KΩ	½		BTS-27K	
R92	220KΩ	½	503422	BTS-220K	
R93	560KΩ	½	503456	BTS-560K	
R94	2700Ω	½	503227	BTS-2700	
R95	1Meg	½	502310	BTS-1Meg	
R96	8200Ω	1	513282	BTA-8200	
R97	2700Ω 5%	½	30733	BTS-2700 5%	
R98	33KΩ	½	513327	BTA-33K	
R99	2700Ω	½	503518	BTS-2700	
R100	820KΩ	½	503482	BTS-820K	
R101	330KΩ	½	504433	BTS-330K	
R102	150KΩ	½	503415	BTS-150K	
R103	150KΩ	½	503415	BTS-150K	
R104	3900Ω	½	502339	BTS-3900	
R105	68KΩ	½	502368	BTS-68K	
R106	4350Ω 5%	2	532343	BTS-4.3K 5%	
R107	2.2Meg	½	503522	BTS-2.2Meg	
R108	470Ω	1	514147	BTA-470	
R109	3300Ω	½	503233	BTS-3300	
R110	15KΩ	½	504315	BTS-15K	
R111	560Ω	½		BTS-560	
R112	560Ω	½		BTS-560	
R113	330KΩ	½	503433	BTS-330K	
R114	820KΩ	½	503482	BTS-820K	
R115	330KΩ	½	503433	BTS-330K	
R116	68KΩ	½	503368	BTS-68K	
R117	3900Ω	½	502339	BTS-3900	
R118	150KΩ	½	503415	BTS-150K	
R119	120KΩ	1	513410	BTA-120K	
R120	68KΩ	½	503368	BTS-68K	
R121	56KΩ	1	513356	BTA-56K	
R122	47Ω	½	504047	BTS-47	
R123	1Meg	½	502310	BTS-1Meg	
R124	3200	4	76410		
R125	15KΩ	3	532315	BTS-15K	
R126	270KΩ	½	503427	BTS-270K	
R127	.82Ω 5%	1	76383		
R128	100Ω	½		BTS-1000	
R129	250Ω	7	79377		
R130	4650Ω	7	79988		
R131	100KΩ	1	514410	BTA-100K	

Note 1: Some versions may use a 22Ω resistor in this application.
Note 2: Some versions may use a 4700Ω resistor in this application.
Note 3: Some versions may use a 2500Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	RCA TYPE No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC ② 2.1A	866VCT ③ .300ADC	5VAC ④ 6A	79387	P-8167 ①	P-3035 ① ⑤				
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC ⑥ 1½ 2A									

① Parallel and phase 6.3V windings for sec. #3.
⑤ Drill new mounting hole.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: RCA Victor PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	79379	B6702	A-3003		V405	A-8125	24A87 ①	A-97X
T3	Horiz. Output Trans	76810	F8419* ①			X094 *①	A-8744 *		D-58*①
T4	Vert. Output Trans.	79394	Z3603 ②	A-3038 ②		V267 ②	A-8145 ②	26S72 ②	A-108X ②
T5A	Yoke-Horiz. (13.5MH)	77625 ③	DF902 ③	MDF-72④		Y70F14-43 ③	DY-9A ③	Y-7 ③	Y-17-1 ④
B	Vert.(24MH)								
T6	Horiz. Lin. (1.8-8.5MH)	78442	RF800 ⑦⑧	MWC-8 ⑦		20R15	WC-8	WC-16 ⑦	WC-12 ⑦
T7	Width (1.8-18MH)	76441	RF800 ⑦	MWC-1 ⑦		20R16	WC-5 ⑦⑧	WC-16 ⑧	WC-12 ⑧

① Drill new mounting hole(s)
② Connect as auto transformer.
③ Includes sole plug, C180, R141, R142 and R128.
④ Connect horizontal damping network across terminals #3 and #7. Use original network if necessary.
⑤ Remove damping capacitor across terminals #1and #2. Use original network if necessary.
⑥ Connect damping network the same as in original yoke.
⑦ Enlarge mounting hole.
⑧ Connect to coded #3 and #4 terminals.
⑨ Connect to coded blue and red terminals.
⑩ Connect to coded #1 and #2 terminals.
⑪ See instructions packed with unit pertaining to yoke damping network.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

TERMINAL (CONNECTIONS)	ORIGINAL	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	5	9			8	5		9
	4	7			7	4		7
	3	5			5	3		5
	2	3			3	2		3
	1	1			1	1		1
Connect Width Coil Across	2 & 1	3 & 1			3 & 1	2 & 1		3 & 1
Special Notes								

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE: PRI	IMPEDANCE: SEC	REPLACEMENT DATA: RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T8	8.2KΩ	1.7Ω	77821	A-3823	A-2901	S-53X	21005	24S61	

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: RCA Victor PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	8"	PM	3.7Ω	74684	ST-115 Mod. P8-V	8A21	
SP2	8"	PM	3.7Ω	74664	ST-115 Mod. P8-V	8A21	

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	UHF Ant. Coil	0Ω		79364				
L2	UHF RF Coil	0Ω						
L3	UHF RF Coil	0Ω						
L4	VHF Mixer Coupling Coil	0Ω						
L5	UHF Mixer Coupling Coil	0Ω						
L6	FIL Choke	0Ω		79585				
L7	FIL Choke	0Ω		79585				
L8	Cathode Choke	0Ω		79585				
L9	UHF Osc. Tank Coil	0Ω		79557				Complete ass'y. -Includes cap.
L10	UHF Osc. Loop Coil	0Ω		79557				Complete ass'y. -Includes cap.
L11	UHF Osc. Coupling Coil	0Ω		79566				Not used in some versions
L12	UHF IF Output Coil	0Ω		79567				
L13	VHF Ant. Trans			79395				
L14	VHF Ant. Trans			79396				
L15	IF Trap	0Ω		79396				Part of complete ass'y.
L16	VHF Ant. Shunt Coil	0Ω		79396				Part of complete ass'y.
L17	VHF Ant. Shunt Coil	0Ω		79396				Part of complete ass'y.
L18	IF Trap	0Ω		79396				Part of complete ass'y.
L19	FM Trap	0Ω		79396				Part of complete ass'y.
L20	VHF Ant. Coils	0Ω		78803				Includes stator complete with rotor & coils
L21	VHF Ant. Coil	0Ω		73458				Channel 6--Part of complete assembly

PARTS LIST & DESCRIPTION (continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L22	VHF Ant. Coil	0Ω		78401				Channel 13
L23	RF Choke	0Ω		77859				
L24	RF Choke	0Ω						
L25	VHF IF Input Coil	0Ω		79542				
L26	Fil. Choke	0Ω		77206				
L27	VHF Feedback Coil	.3Ω		78466				
L28	VHF Neut. Coil	0Ω		76562				
L29	VHF RF Coil	0Ω		77921				Channel 13-Part of complete assembly
L30	VHF RF Coils	0Ω		78274				Includes stator complete with rotor, coils, caps. & resistors
L31	VHF RF Coil	0Ω		73460				Channel 6-Part of complete assembly
L32	UHF IF Coil	0Ω		78584				Part of complete ass'y.
L33	VHF Mixer IF Coil	0Ω		78583				Part of complete ass'y.
L34	VHF Mixer Grid Coils	0Ω		78272				Includes stator complete with rotor, coils, caps, & resistors
L35	VHF Mixer Grid Coil	0Ω		73874				Channel 6-Part of complete assembly
L36	VHF Mixer Grid Coil	0Ω		77919				Channel 13-Part of complete assembly
L37	Fil. Choke	0Ω		76763				
L38	VHF Osc. Coil	0Ω		77915				Channel 13-Part of complete assembly
L39	VHF Osc. Coils	0Ω		79068				Includes stator complete with rotor, coils & trimmer
L40	VHF Conv. Plate	.2Ω	0Ω	78399				Includes 27KΩ resistor
L41	47.25MC Trap	0Ω		79390	17-4523*			
L42	39.25MC Trap	0Ω		79383	17-4522■			
L43	1st Video IF	0Ω	0Ω	79388	17-4531▲			Includes 39.25MC trap & 5.6KΩ resistor
L44	2nd Video IF	.2Ω	.2Ω	76433	17-4522		6219	
L45	Fil. Choke	0Ω		73477	19-3001	TV-189	4604	1 Microhenry
L46	3rd Video IF	.2Ω	.2Ω	76433	17-4523		6219	
L47	4th Video IF	.2Ω	.2Ω	76433	17-4524		6219	
L48	5th Video IF	.1Ω		79389				Includes caps., coils, resistor & M3
L49	Shunt Peaking Coil	7.5Ω		98482	19-3250	TV-185	6181	250 Microhenries
L50	4.5MC Trap	2.7Ω		76482	20-1004♦	TV-151♦	1469♦	Wound on 47MMF cap.
L51	Shunt Peaking Coil	16Ω		75252	19-3500	TV-188	6174	500 Microhenries
L52	Series Peaking Coil	6.8Ω		76647	19-3180▲	TV-182	6179	180 Microhenries; Wound on 22KΩ resistor
L53	1st Sound IF	6.5Ω		79386				Tapped ⓐ 2.5Ω
L54	2nd Sound IF	1.7Ω		76981	17-1071			Includes resistor & cap.
L55	Ratio Det.	11Ω	.2Ω	77112	17-1033	TV-110	1468	Tertiary winding = .2Ω
L56	Horiz. Osc.	77Ω		79160	20-1402†	TV-162†	6183†	Tapped ⓐ 55Ω
L57	Horiz. Phase	44Ω		79161	20-1402†	TV-162†	6183†	
L58	RF Choke	.72Ω		76640	19-1001		4604	1.5 Microhenries

* Use one winding only and remove shunt resistor.
■ Use one winding only.
▲ Retune.
♦ Drill mounting hole.
▲ Parallel with 22KΩ resistor.
† Replaces horiz. osc. and horiz. phase coil. Cut out chassis hole and drill mounting holes.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D.C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: RCA Victor PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
L59	.300ADC	38Ω	1.3HY	77676	C-2326 ①	C-2996 ①	C-23X ①	C5037 ①	26C44 ①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: RCA Victor PART No. FUSE	RCA Victor PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	3/10A 250V	78214	78218	312.300 (3AG 3/10A)	357001	AGC 3/10	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: RCA Victor PART No.	FEDERAL PART No.	SYLVANIA PART No.	NOTES
M2	K3D*	77489	1N82	1N82 or 1N82A	UHF Mixer
M3	1N60		1N64A	1N60 or 1N132	Video Det.

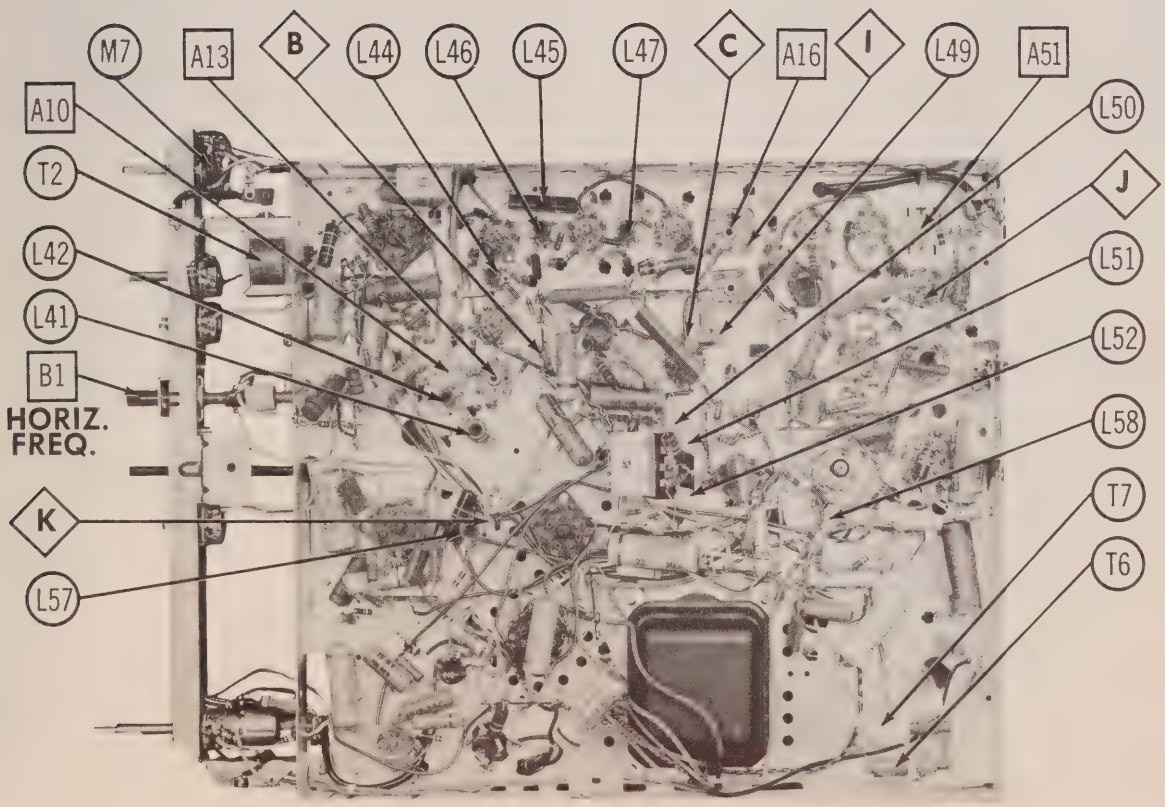
* Some versions may use a 1N82 crystal diode in this application.

PARTS LIST & DESCRIPTION (continued)

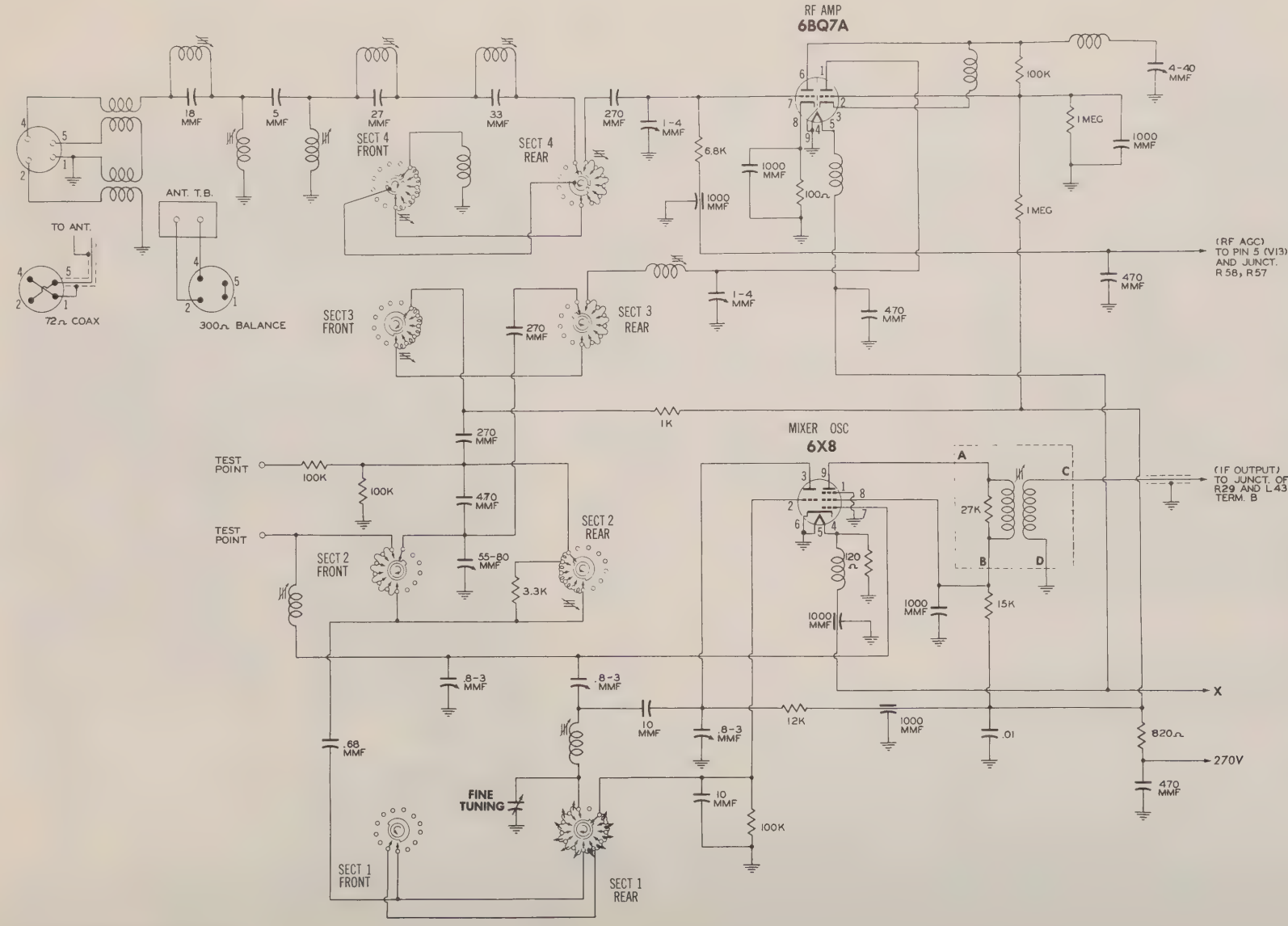
MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M4	Dial Light	11891	#44, Bayonet
M5A	Tuner	KRK30C	VHF-UHF Model 21-D-527U
B	Tuner	KRK22D	VHF Model 21-D-527
M6	Switch	79374	VHF-UHF
M7	Switch	77656	TV-Phono & Tone
M8	Focus Magnet	76168	Includes centering device
M9	Ion Trap	76141	
A18	Trimmer Cap.	77616	RF plate trimmer (4-40MMF)
A19	Trimmer Cap.	71496	Video IF Input (5-70MMF)
B3	Trimmer Cap.	79376	Horiz. Drive (10-160MMF)
	Knob	79425	Channel Selector - For blonde instruments model 21-D-527
	Knob	79466	Channel Selector - For mahogany instruments model 21-D-527
	Knob	79426	Channel Selector - For blonde instruments model 21-D-527U
	Knob	79467	Channel Selector - For mahogany instruments model 21-D-527U
	Knob	79464	Fine Tuning - Model 21-D-527
	Knob	79465	Fine Tuning - Model 21-D-527U
	Knob	79444	Contrast - For blonde instruments
	Knob	79470	Contrast - For mahogany instruments
	Knob	79445	On-Off-Volume - For blonde instruments
	Knob	79471	On-Off-Volume - For mahogany instruments
	Knob	79133	TV-Phono & Tone Switch
	Knob	79150	Horiz. Freq.
	Dial	79436	UHF Dial - For blonde instruments Model 21-D-527U
	Dial	79468	UHF Dial - For mahogany instruments Model 21-D-527U
	Safety Glass	78872	
	Mask	79438	
	Emblem	77783	"Deluxe"

PROPERTY OF
L. F. [illegible]



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION



A PHOTOFACT STANDARD NOTATION SCHEMATIC
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VHF TUNER KRK 22D USED ON CHASSIS KCS 90

ALTERNATE TUNER SCHEMATIC

TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V18, V19, V20 and V21. Check M1 fuse. Check waveform W15.

If Satisfactory	If Unsatisfactory
Check T3, T5, T6, T7, C119, C120, C116, C121, C118, R125, R124 and other associated components.	Check C112, C113, C114, R121, R119, L56, L57 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20, V22 and V23. Check C114, C117, R125, R124 and other associated components. Check adjustments B3, B4 and B5.

BLOOMING

Check by substitution V19, V20, V21, V22 and V23. Check R124, R125, C117, C114, T3, T5A and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V2, V3, V4, V5, V6, V7 and V8. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T5 and its associated components.

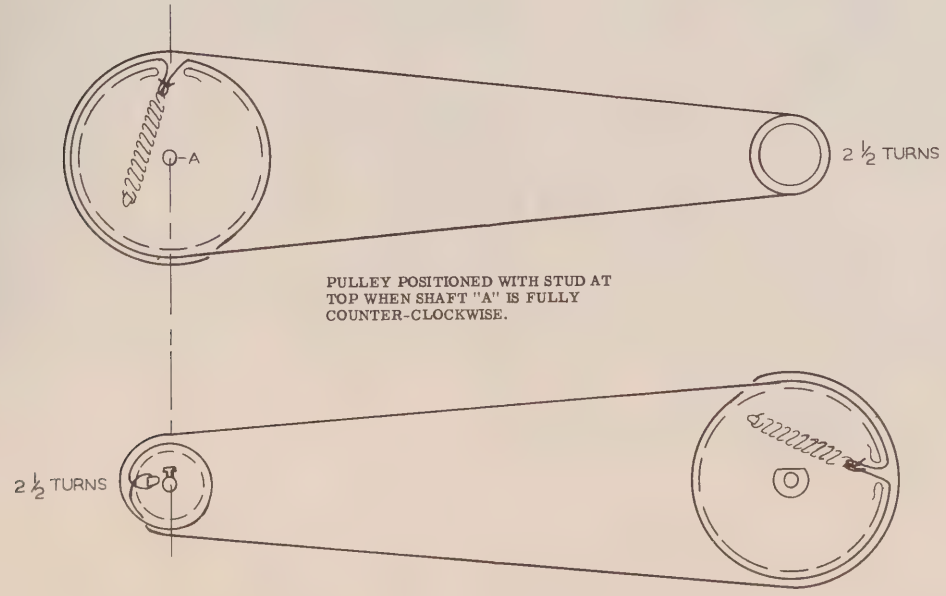
INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

TELEVISION CHANNEL FREQUENCIES

Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier	Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier	Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier	Channel No.	Frequency Band (Mc)	Video Carrier	Sound Carrier
2	54-60	55.25	59.75	23	524-530	525.25	529.75	44	650-656	651.25	655.75	64	770-776	771.25	775.75
3	60-66	61.25	65.75	24	530-536	531.25	535.75	45	656-662	657.25	661.75	65	776-782	777.25	781.75
4	66-72	67.25	71.75	25	536-542	537.25	541.75	46	662-668	663.25	667.75	66	782-788	783.25	787.75
5	76-82	77.25	81.75	26	542-548	543.25	547.75	47	668-674	669.25	673.75	67	788-794	789.25	793.75
6	82-88	83.25	87.75	27	548-554	549.25	553.75	48	674-680	675.25	679.75	68	794-800	795.25	799.75
7	174-180	175.25	179.75	28	554-560	555.25	559.75	49	680-686	681.25	685.75	69	800-806	801.25	805.75
8	180-186	181.25	185.75	29	560-566	561.25	565.75	50	686-692	687.25	691.75	70	806-812	807.25	811.75
9	186-192	187.25	191.75	30	566-572	567.25	571.75	51	692-698	693.25	697.75	71	812-818	813.25	817.75
10	192-198	193.25	197.75	31	572-578	573.25	577.75	52	698-704	699.25	703.75	72	818-824	819.25	823.75
11	198-204	199.25	203.75	32	578-584	579.25	583.75	53	704-710	705.25	709.75	73	824-830	825.25	829.75
12	204-210	205.25	209.75	33	584-590	585.25	589.75	54	710-716	711.25	715.75	74	830-836	831.25	835.75
13	210-216	211.25	215.75	34	590-596	591.25	595.75	55	716-722	717.25	721.75	75	836-842	837.25	841.75
14	470-476	471.25	475.75	35	596-602	597.25	601.75	56	722-728	723.25	727.75	76	842-848	843.25	847.75
15	476-482	477.25	481.75	36	602-608	603.25	607.75	57	728-734	729.25	733.75	77	848-854	849.25	853.75
16	482-488	483.25	487.75	37	608-614	609.25	613.75	58	734-740	735.25	739.75	78	854-860	855.25	859.75
17	488-494	489.25	493.75	38	614-620	615.25	619.75	59	740-746	741.25	745.75	79	860-866	861.25	865.75
18	494-500	495.25	499.75	39	620-626	621.25	625.75	60	746-752	747.25	751.75	80	866-872	867.25	871.75
19	500-506	501.25	505.75	40	626-632	627.25	631.75	61	752-758	753.25	757.75	81	872-878	873.25	877.75
20	506-512	507.25	511.75	41	632-638	633.25	637.75	62	758-764	759.25	763.75	82	878-884	879.25	883.75
21	512-518	513.25	517.75	42	638-644	639.25	643.75	63	764-770	765.25	769.75	83	884-890	885.25	889.75
22	518-524	519.25	523.75	43	644-650	645.25	649.75								



UHF DRIVE CORD STRINGING

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removing the Channel Selector and Fine Tuning knobs.

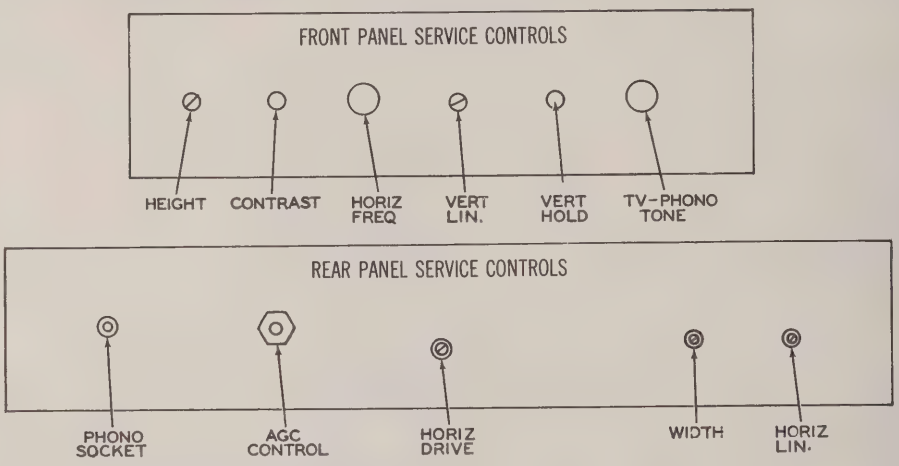
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove rear cover and 10 spring clips from inside front of cabinet. Remove metal molding and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS-AGC CONTROL ADJUSTMENT

If receiver overloads on a strong signal, turn AGC control counter clockwise until picture on screen shows no sign of pulling. Never adjust AGC on the weakest signal being received.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency control B1 is located on the front of the chassis. If horizontal sync cannot be brought in with B1, set it at approximately its mid-range position and bring picture in sync with B2.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF Detector Buzz adjust L55 secondary located on bottom of chassis. A hole is provided in bottom of cabinet for this adjustment.

FUSES

One fuse is used for Horiz. Sweep Circuit protection. (For location see Tube Placement Chart.)

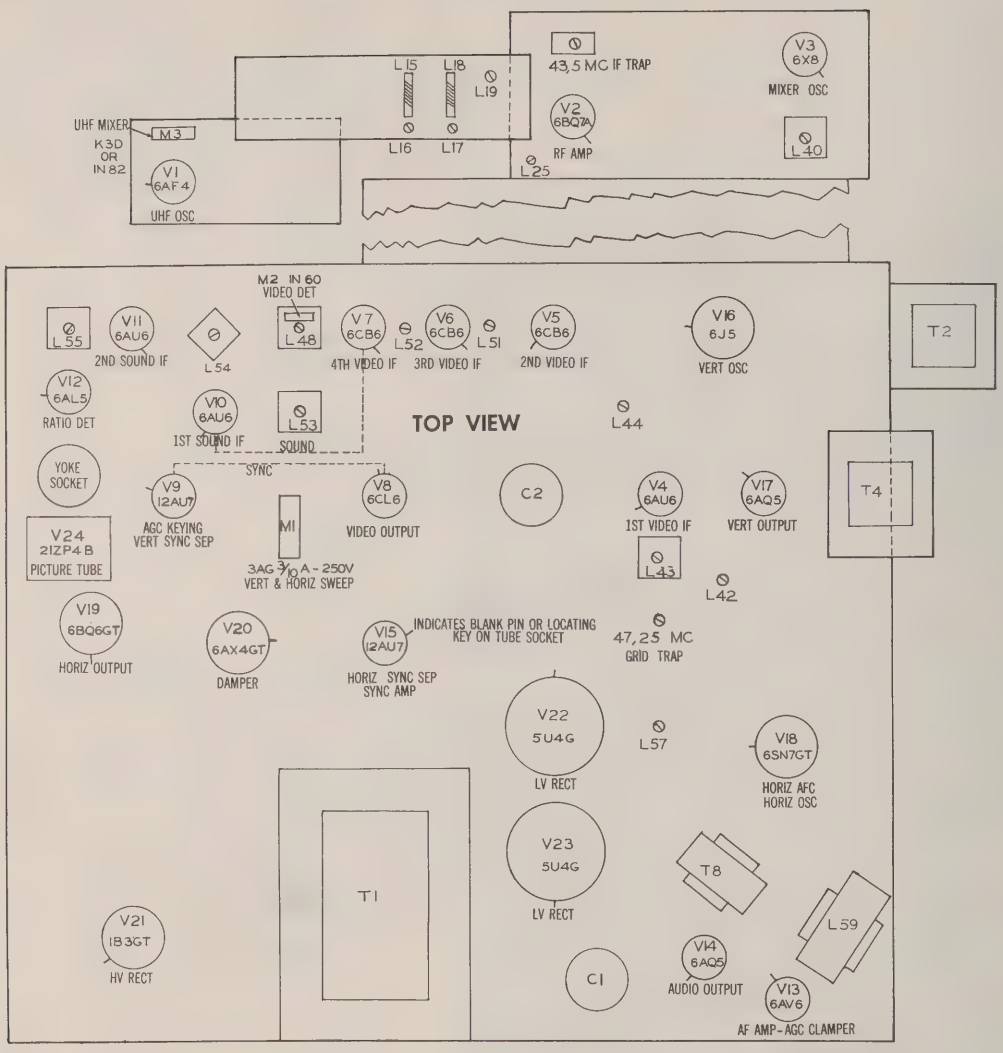
CENTERING

Centering is accomplished mechanically by means of a centering lever on the P. M. Focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 4 push-on type control knobs and UHF dial from front of cabinet. Also remove one push-on type knob from under front control door.
2. Remove 2 spring clips and loosen 2 screws. Remove rear cover.
3. Disconnect picture tube socket, HV lead, deflection yoke socket and speaker leads.
4. Remove 7 chassis bolts. Remove chassis.
5. Remove 8 speaker nuts (4 from each speaker). Remove 2 speakers.

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

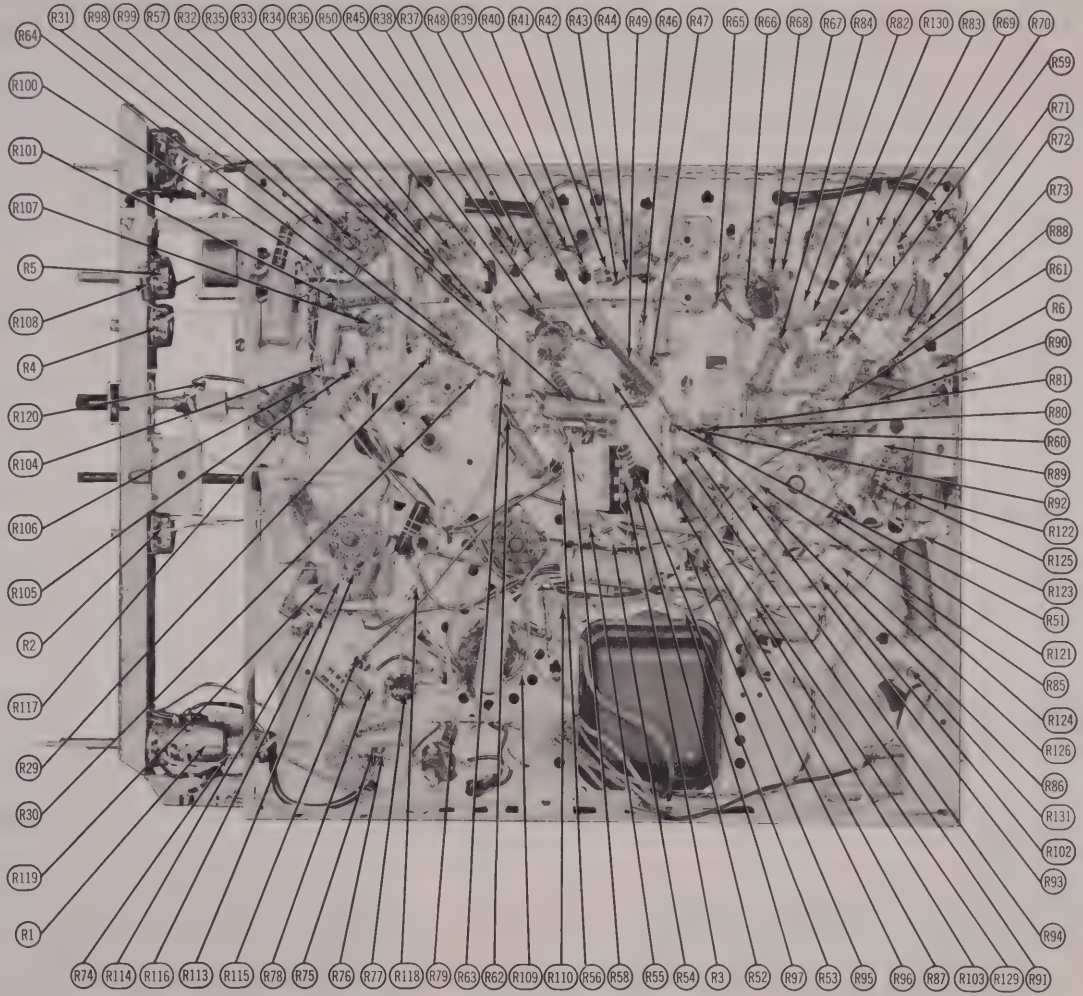
The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - **V22, V23**

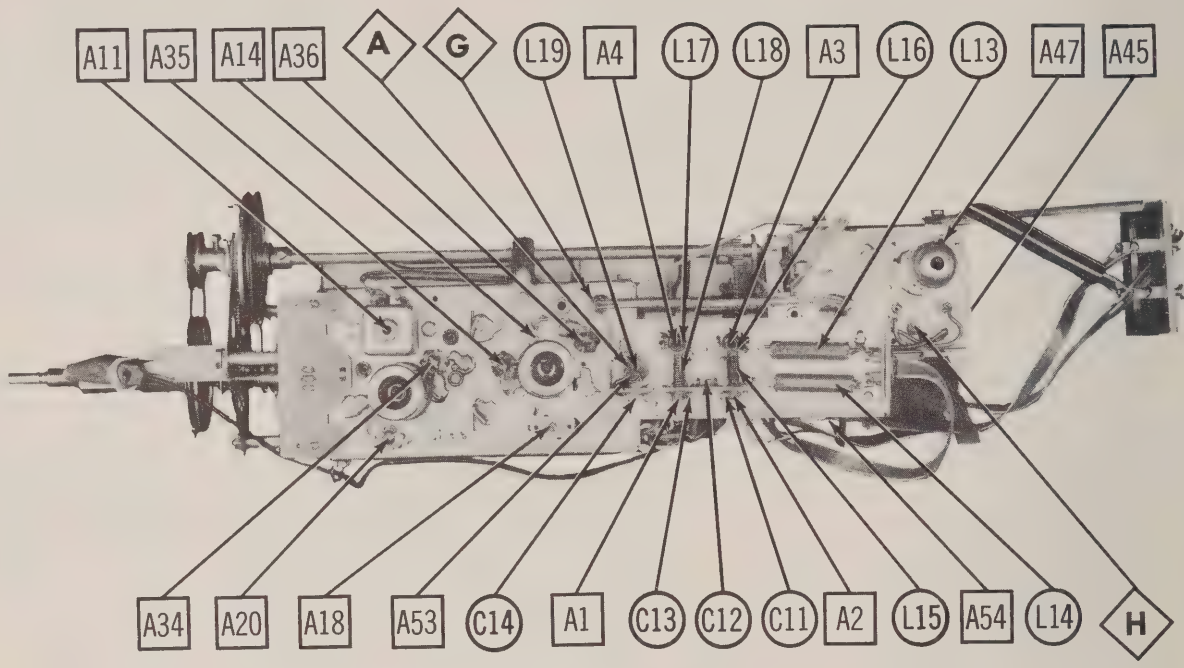
LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, V5, V6, V7, (V1 UHF only)**
No pic, no sound, has snow - **V2, V3, V4**
No pic, has sound, has raster - **V8, V9, V24**
Has pic, no sound - **V10, V11, V12, V13, V14**
Overloaded picture - **V9, V13**

SYNC FAILURE
No vert. sync - **V9, V15, V16**
No horiz. sync - **V15, V18**
No vert. or horiz. sync - **V15**

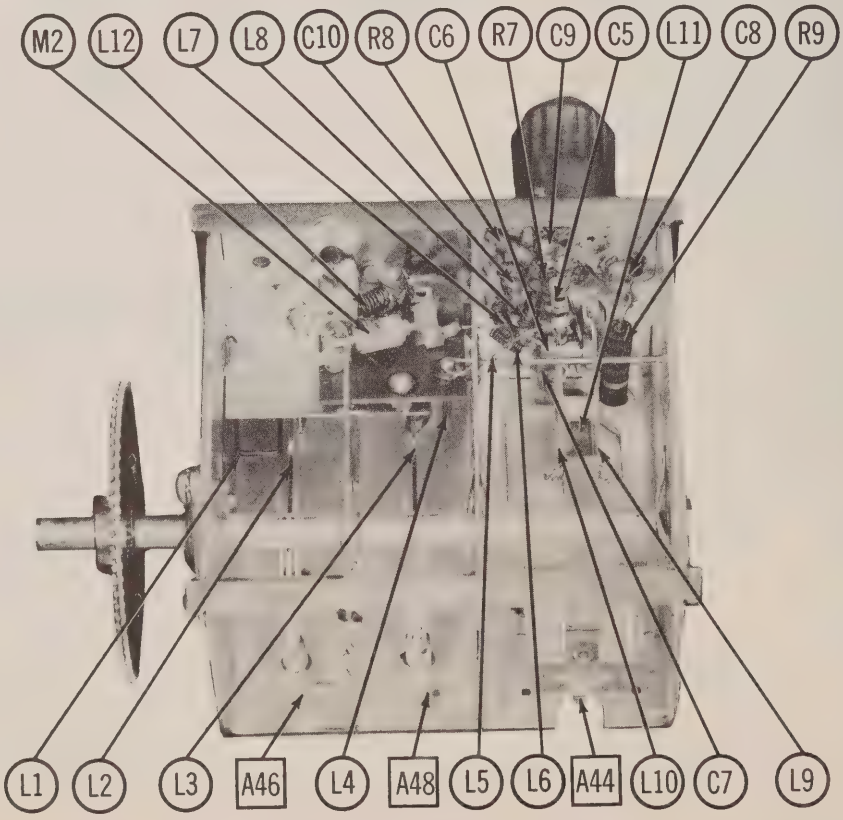
SWEEP FAILURE
No raster, has sound - **V18, V19, V20, V21, V24, Fuse (M1)**
No vertical deflection - **V16, V17**
Poor vert. linearity or foldover - **V16, V17**
Poor horiz. linearity or foldover - **V18, V19, V20**
Narrow picture - **V18, V19, V20, V21, V22, V23**
Vert. off freq. - **V9, V15, V16**
Horiz. off freq. - **V15, V18**



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



UHF-VHF TUNER-TOP VIEW



UHF TUNER-RIGHT SIDE

PROPERTY OF
L. F. B[illegible]
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REVERE
MODEL 400

TRADE NAME Revere Model 400
MANUFACTURER Revere Camera Co., 320 E. 21st. St., Chicago, Ill.
TYPE SET Three Power Portable AM Superheterodyne Receiver
TUBES (Four) Types 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Output

POWER SUPPLY 110-120 Volts AC-DC (or) 7½ Volts "A" Supply & 67½ Volts "B" Supply
RATING .12 Amp. @ 117 Volts AC (or) 50MA @ 7½ Volts DC & 9MA @67½ Volts DC
TUNING RANGE—BROADCAST 540KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 6 (grid) of 1R5 (V1). Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer, reduce dummy antenna to 200MMF to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal	"	A6	"

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		REVERE PART No.	STANDARD REPLACEMENT		
V1	Converter	1R5	1R5	7AT	
V2	IF Amplifier	1U4	1U4	6AR	
V3	Det.-AVC-AF Amp	1U5	1U5	6BW	
V4	Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	REVERE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	50	150	A119-8	PRS106D20A		BBRT5315			TVA-3433	Red
B	30	150				C10				Green
C	100	15								Black
C2	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C3	.047	600		P688-047	DF-503	CUB6S47		PT6147	6TM-S47	
C4	47									
C5	13									
C6	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C7	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C8A	100		†A177-4	†PA-97-1	†PC-50	†111TM1	†1403-01	UC-531	†D-1	
B	100							UC-531		
C9	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	
C10A	5000							DC-525		
B	100		♦A177-3	♦PA-117	♦PC-91	♦114TM2	♦1407-03	UC-531	♦P-2	
C	5000							DC-525		
C11	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	

† Items C8A, C8B and R6 are combined in one unit.
♦ Items C10A, C10B, C10C, R9A, R9B, R9C are combined in one unit.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	REVERE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1	1Meg	½	A140-8A					Volume

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	REVERE PART No.	IRC PART No.	
R2	100KΩ	½		BTS-100K	
R3	10Meg	½		BTS-10Meg	
R4	1200Ω	½		BTS-1200	
R5	220Ω	½		BTS-220	
R6	47KΩ	½	†A177-4	BTS-47K	
R7	4.7Meg	½		BTS-4.7Meg	
R8	10Meg	½		BTS-10Meg	

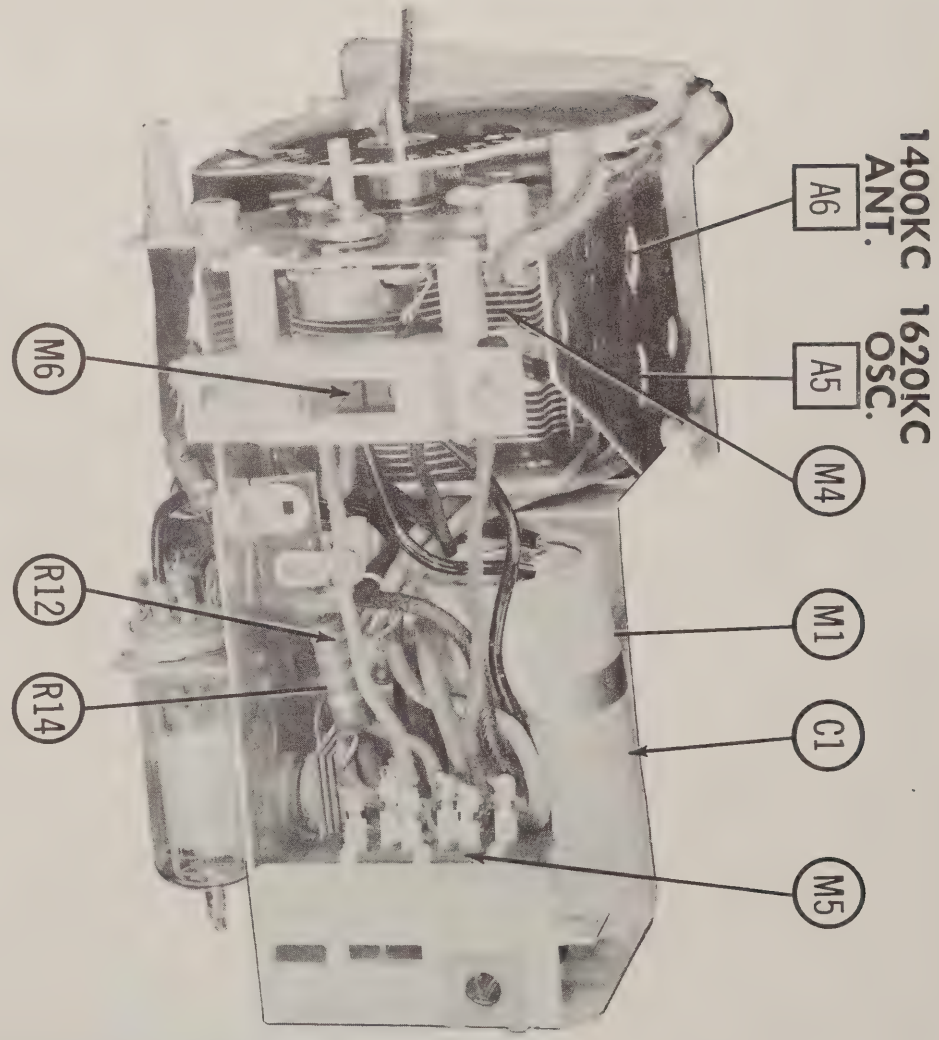
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	REVERE PART No.	IRC PART No.	
R9A	4.7Meg	½		BTS-4.7Meg	
B	1Meg	½	♦A177-3	BTS-1Meg	
C	2.2Meg	½		BTS-2.2Meg	
R10	15Meg	½		BTS-15Meg	
R11	1500Ω	1		BTA-1500	
R12	2200Ω	1		BTA-2200	
R13	2000Ω	7	A106-6		
R14	150Ω		A106-7		

† Items R6, C8A and C8B are combined in one unit.
♦ Items R9A, R9B, R9C, C10A, C10B, C10C are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	REVERE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	9.6KΩ	3.4Ω		A-3329	A-2927	S-11X		24S49	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	REVERE PART No.	VIKING PART No.	QUAM PART No.	
SP1	3"	PM	3.4Ω		3J6		

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	REVERE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	1.3Ω		A133-2				Includes case, bottom cover and metal fittings
L2	Osc. Coil	1.3Ω	6.8Ω	A132-6	14-1074		71-OSC	
L3	Fil. Choke	4.5Ω		A133-1	19-3300	TV-185	6155	300 Microhenries
L4	Input IF	15Ω	15Ω	A132-3			10-C1	
L5	Output IF	15Ω	15Ω	A132-3			10-C2	

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT	REVERE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	
M1	.060A		1263A	RS65			8J1	

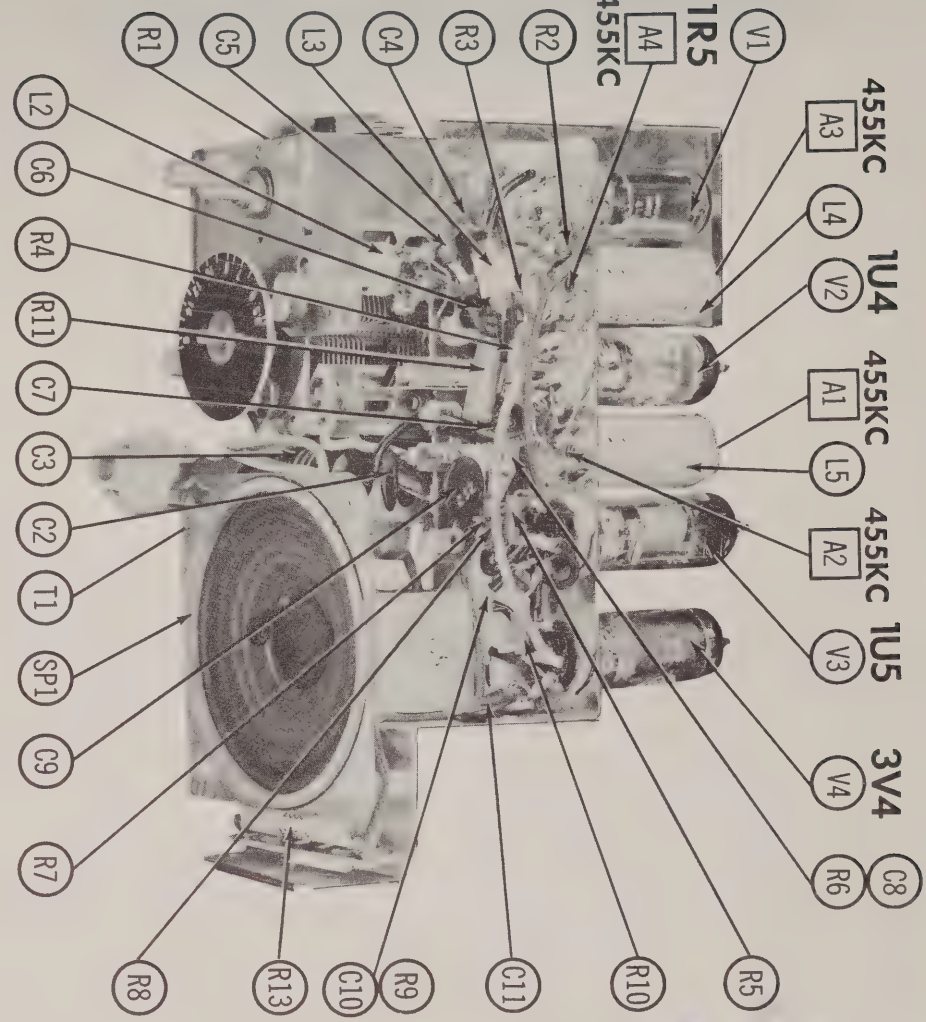
BATTERIES

ITEM No.	VOLTAGE	REVERE PART No.	REPLACEMENT DATA						INSTALLATION NOTES
			EVEREADY			BURGESS			
			"A"	"B"	"A-B"	"A"	"B"	"A-B"	
M2	7½V "A"		717			C5			
M3	67½V "B"			467			XX45		

MISCELLANEOUS

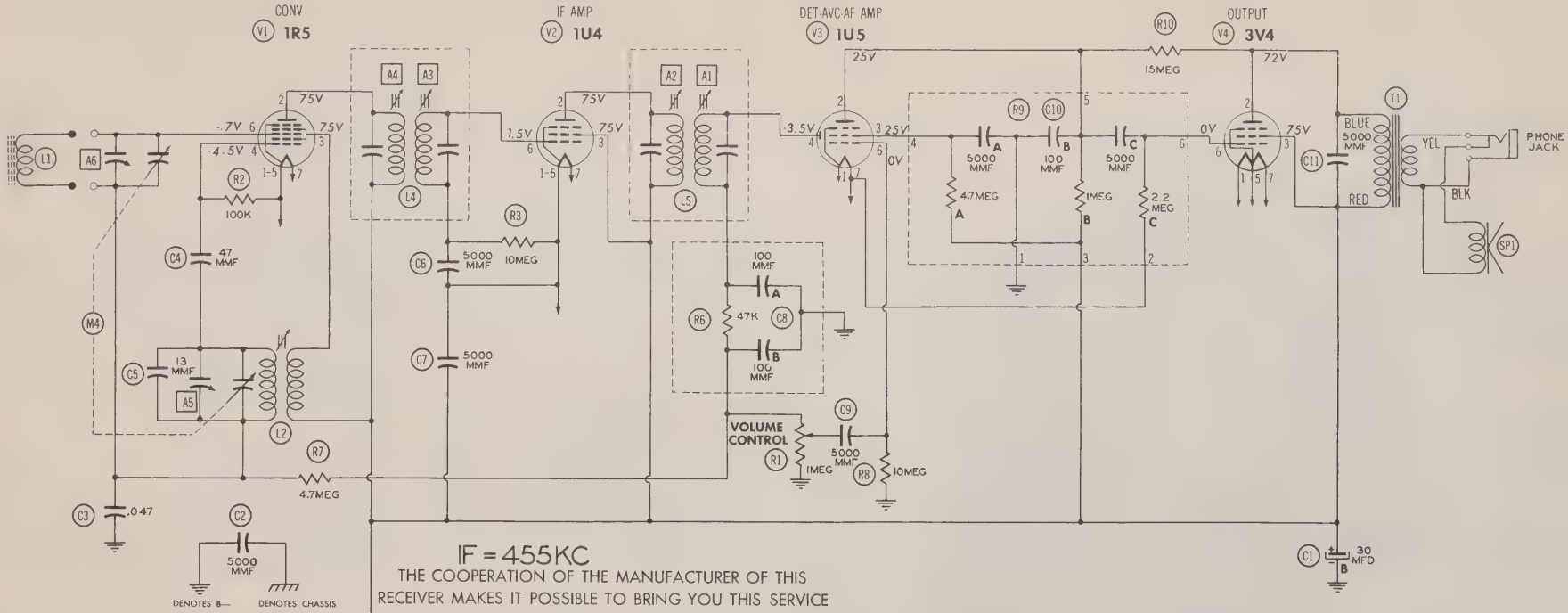
ITEM No.	PART NAME	REVERE PART No.	NOTES
M4	Tuning Cap.	A142-[illegible]	13-260MMF, 10-130MMF
M5	Switch	A141-[illegible]	On-off
M6	Switch	A141-5	Change-over
	Knob	B15-11946	Control (2 used)
	Dial Assy.	A14-11975	Numbered

CHASSIS—BOTTOM VIEW



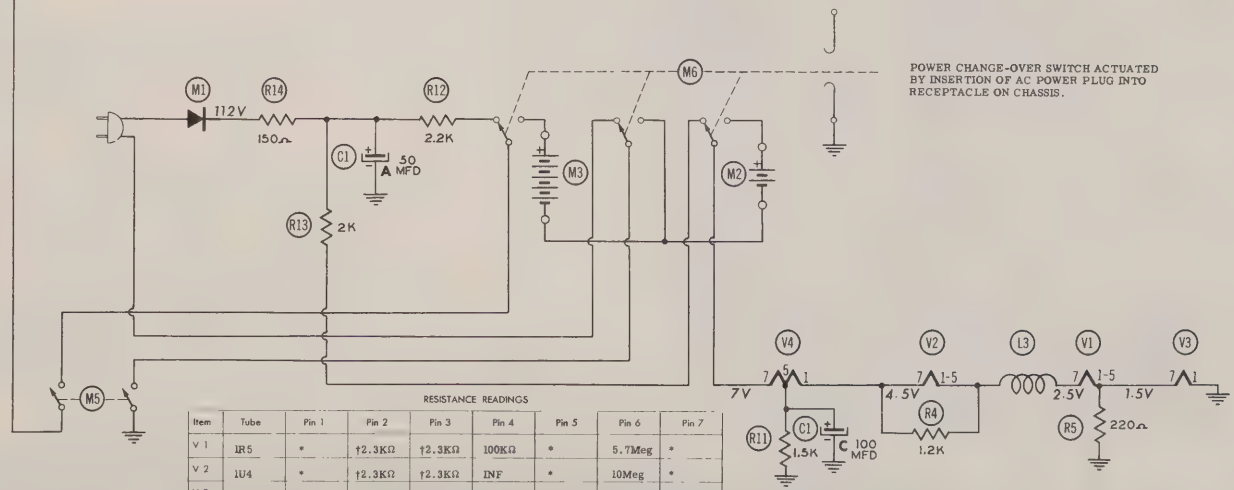
PROP
F.L.
SPK MB
DENT, COLUMBIA

REVERE MODEL 400



IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†2.3KΩ	†2.3KΩ	100KΩ	*	5.7Meg	*
V 2	1U4	*	†2.3KΩ	†2.3KΩ	INF	*	10Meg	*
V 3	1U5	*	†1Meg	†4.7Meg	1Meg	1Meg	10Meg	*
V 4	3V4	*	†2.5KΩ	†2.3KΩ	INF	*	2.2Meg	*

† MEASURED FROM OUTPUT OF M1
* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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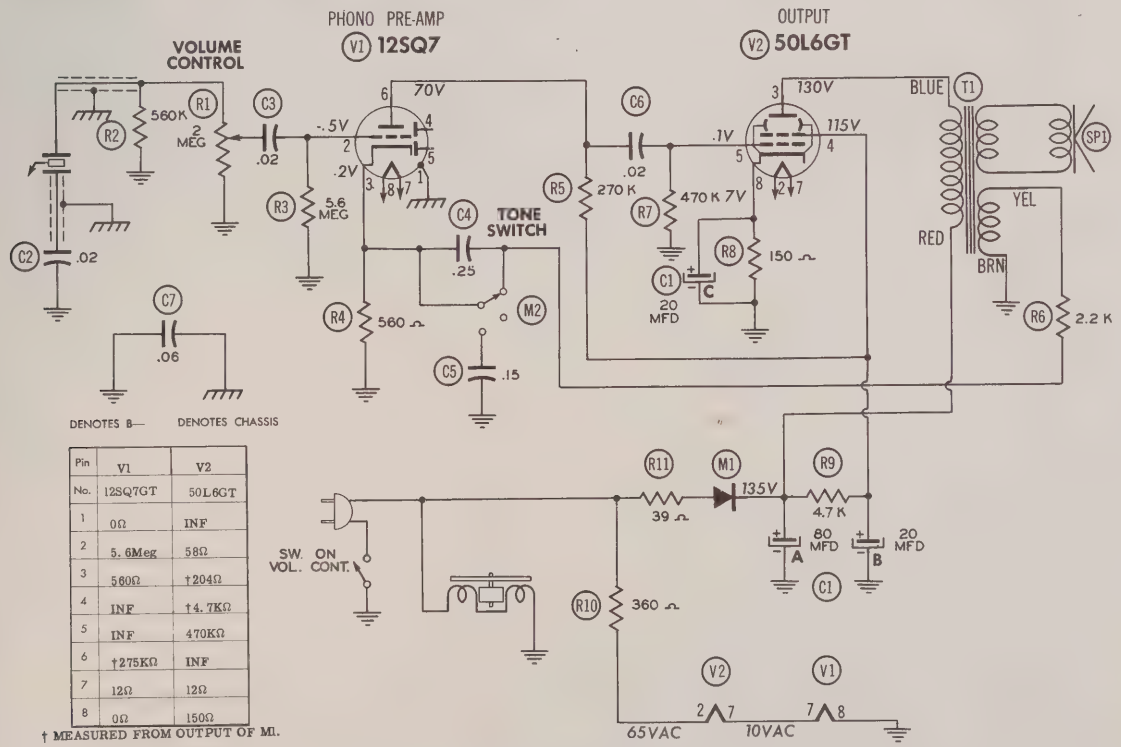
269-13

SILVERTONE
MODELS 2249, 2250 (Ch. 137.915)

TRADE NAME	Silvertone Model 2249, 2250 (Ch. 137. 915)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan St., Chicago, Ill.
TYPE SET	AC Operated Phono Amplifier With 3 Speed Automatic Record Changer
TUBES (Two)	Types 12SQ7GT AF Amp., 50L6GT Output
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING . 27 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT C10393 - SEE V-M MODEL 950 PHOTOFACT SET #216 - FOLDER #11 OR RECORD CHANGER MANUAL CM-5.



Pin No.	V1 12SQ7GT	V2 50L6GT
1	0Ω	INF
2	5.6Meg	58Ω
3	560Ω	†204Ω
4	INF	†4.7KΩ
5	INF	470KΩ
6	†275KΩ	INF
7	12Ω	12Ω
8	0Ω	150Ω

† MEASURED FROM OUTPUT OF M1.

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THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: SILVERTONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	Phono Pre-Amp.	12SQ7GT	12SQ7GT	8Q	
V2	Audio Output	50L6GT	50L6GT	7S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	80	150	C10427	PRS150/80-40-20		EDL8415C		3N538	TVA-3455	Blue
B	20	150								Red
C	20	25								Yellow
C2	.02	200	C10497	P488-02	DD-203	PJ2S2		PT412	2TM-S2	
C3	.02	200	C10497	P488-02	DD-203	PJ2S2		PT412	2TM-S2	
C4	.25	200	C10858	P488-25		PJ2P25		PT4025	2TM-P25	
C5	.15	200	C10857	P488-15		PTE4P15		TP417	2TM-P15	
C6	.02	200	C10497	P488-02	DD-203	PJ2S2		PT412	2TM-S2	
C7	.06	200	C10502	P688-06		PTE6S6		PT616	6TM-S6	

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2Meg	½	C10496	Q13-139	AG-66-Z	AB-76	U-55	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	KB-1	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	NOTES
R2	560KΩ	½	C8842	BTS-560K	
R3	5.6Meg	½	C10301	BTS-5.6Meg	
R4	560Ω	½	C10921	BTS-560	
R5	270KΩ	½	C8841	BTS-270K	
R6	2200Ω	½	C10986	BTS-2200	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: SILVERTONE PART No.	IRC PART No.	NOTES
R7	470KΩ	½	C10305	BTS-470K	
R8	150Ω	½	C9897	BTS-150	
R9	4700Ω	½	C10429	BTS-4700	
R10	360Ω	10	C10584	1 3/4A-350	
R11	39Ω	½	C10428		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: SILVERTONE PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T1	2.3KΩ	2.9Ω	C10977						Feedback Winding = 1Ω DC

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: SILVERTONE PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	6"	PM	2.9Ω	C10987	ST-108 Mod. P6-X	6A1	

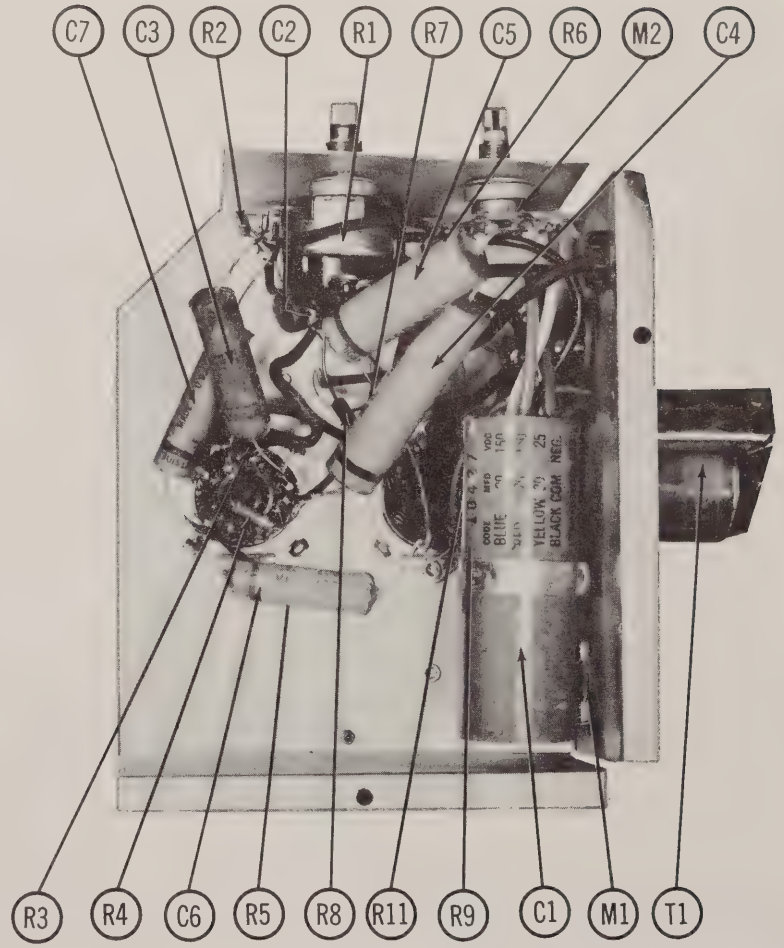
SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: SILVERTONE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	SELETRON PART No.	NOTES
M1	.056A	C10432	1002A	RS65	6S65	65	8J1	

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M2	Switch	C10879	Tone Selector
	Case	C2249	Brown
	Case	C2250	Grey
	Knob	C10989	Volume
	Knob	C10988	Tone

CHASSIS—BOTTOM VIEW



PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA: SILVERTONE PART No.	ASTATIC PART No.: CARTRIDGE	ASTATIC PART No.: NEEDLE	SHURE PART No.: CARTRIDGE	SHURE PART No.: NEEDLE	ELECTRO-VOICE PART No.: CARTRIDGE	ELECTRO-VOICE PART No.: NEEDLE	REMARKS
M3	C10976	51-2J	G-AG-J	WC36B	A56U	47	O-2 or S-2	

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA: SILVERTONE PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M4	C10637	* S-652 (or) † S-642 (or) ♦ S-642D	* B-326 (or) † B-334 (or) ♦ B-334D	* W-3AGA (or) † W-3AGS	* Metal † Jewel ♦ Diamond

PROPERTY OF
DENVER, COLO.

V-M
MODEL 560-B, -M

V-M
MODEL 560-B, -M

TRADE NAME	V-M Model 560B, 560M
MANUFACTURER	V-M Corp., Benton Harbor, Mich.
TYPE SET	AC Operated 5 Watt Phono Amplifier With 3 Speed Automatic Record Changer
TUBES (Four)	Types 12AX7 AF Amp.-Phase-Inv., (2) 6V6GT Output, 6X5GT Rectifier
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING .4 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		V-M PART No.	STANDARD REPLACEMENT		
V1	AF Amp. - Phase Inverter	12AX7	12AX7	9A	
V2	Output	6V6GT	6V6GT	7S	
V3	Output	6V6GT	6V6GT	7S	
V4	Rectifier	6X5GT	6X5GT	6S	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	V-M PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲20	450		AFH4-14		D013		FP444	TVL-4763	
B	■20	450								
C	▲20	450								
D	20	450								
C2	.047	400		P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C3	.047	400		P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C4	.0022	600		P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C5	.0022	600		P688-0022	D6-222	CUB6D22	GP2-333-222	PT6222	6TM-D22	
C6	.047	400		P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C7	.047	400		P488-047	DF-503	CUB4S47		PT4147	4TM-S47	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	V-M PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	11983	Q13-133	A47-500K-Z	AB-60	U-48	Volume - Note 1
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	1Meg	½	11982				UF16L	Tone -Note 2
B	1Meg	½					UR16L	
C	Shaft						DS-36	Attach to R2A

Note 1: Some versions may use an alternate control part no. 11976.
Note 2: Some versions may use an alternate control part no. 11975.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	V-M PART No.	IRC PART No.	
R3	5.6Meg	½		BTS-5.6Meg	
R4	3900Ω	½		BTS-3900	
R5	220KΩ	½		BTS-220K	
R6	68KΩ	½		BTS-68K	Note 1
R7	22KΩ	½		BTS-22K	
R8	22KΩ	½		BTS-22K	
R9	1Meg	½		BTS-1Meg	
R10	1000Ω	½		BTS-1000	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	V-M PART No.	IRC PART No.	
R11	220KΩ	½		BTS-220K	
R12	220KΩ	½		BTS-220K	
R13	470KΩ	½		BTS-470K	
R14	200Ω	5		PW7-200	
R15	470KΩ	½		BTS-470K	
R16	10KΩ	½		BTS-10K	
R17	100KΩ	½		BTS-100K	
R18	470Ω	1		BTA-470	
R19	12Ω	½		BTS-12	Note 1

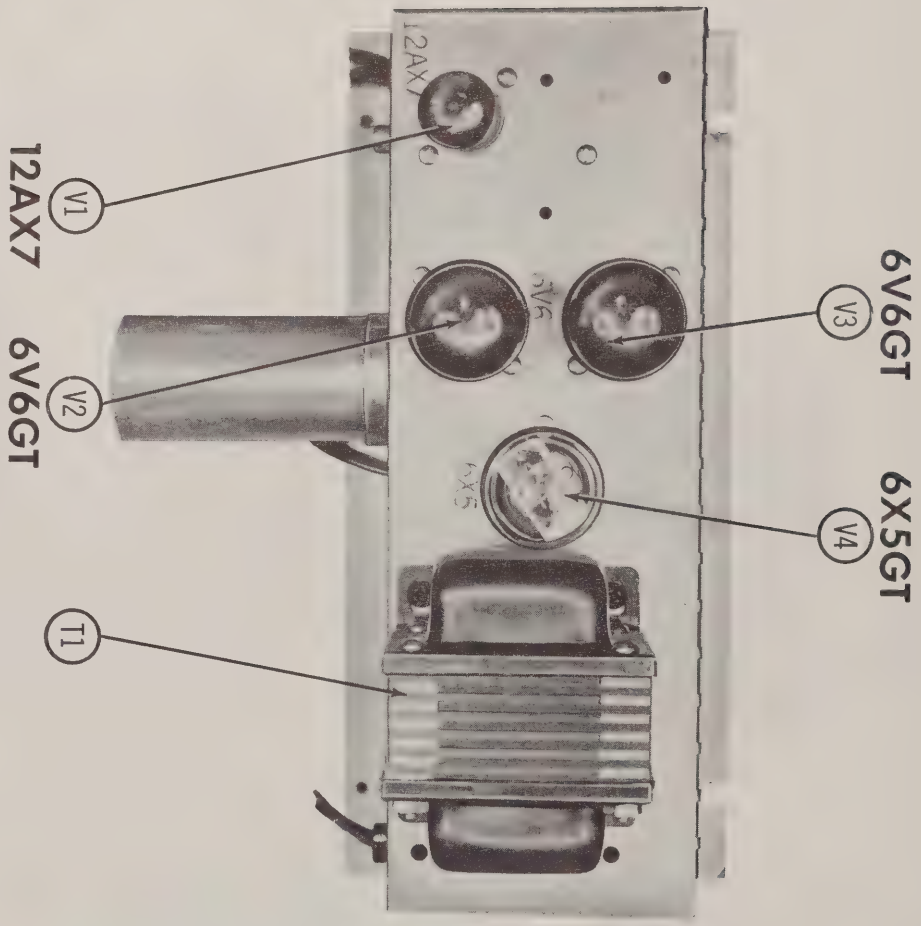
Note 1: Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	V-M PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC ⓐ .4A	532VCT .067A	6.3VCT ⓐ 1.9A		12516-6	PC-8404 ① ②		R-10A ① ②	P9204 ②	22R30 ① ②

① Drill new mounting holes.
② Tape 5V winding.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA V-M PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	7KΩCT	500Ω Tap @ 16Ω @ 8Ω @ 4Ω	12515					26S59	

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA V-M PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	5" X 7"	PM	3.3Ω	6785-1	57J9	57A1	
SP2	5" X 7"	PM	3.3Ω	6785-1	57J9	57A1	
SP3	6" X 9"	PM	3.5Ω	6786-1	69J9	69A3	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA V-M PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC NEEDLE	SHURE PART No. CARTRIDGE	SHURE NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE NEEDLE	REMARKS
M1						47	0-1 or S-1 and 0-3	

ELECTRO-VOICE NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

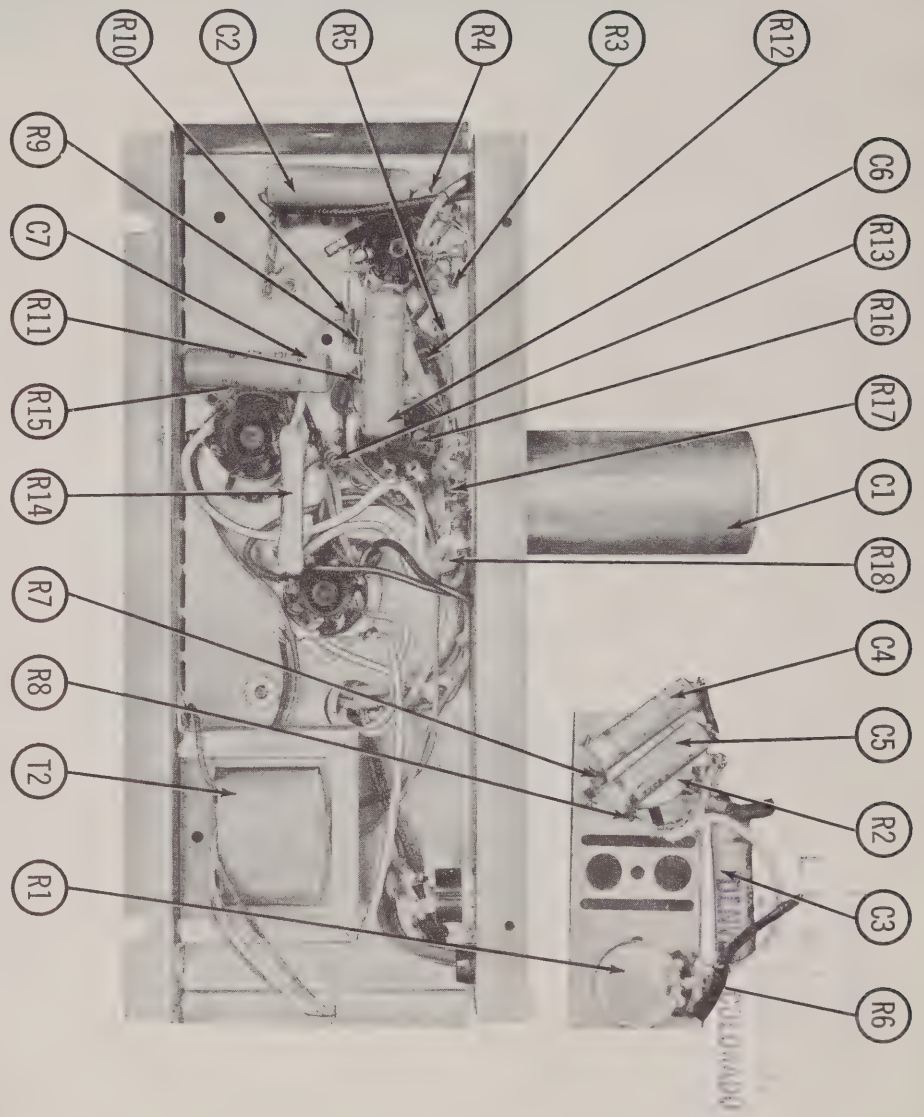
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

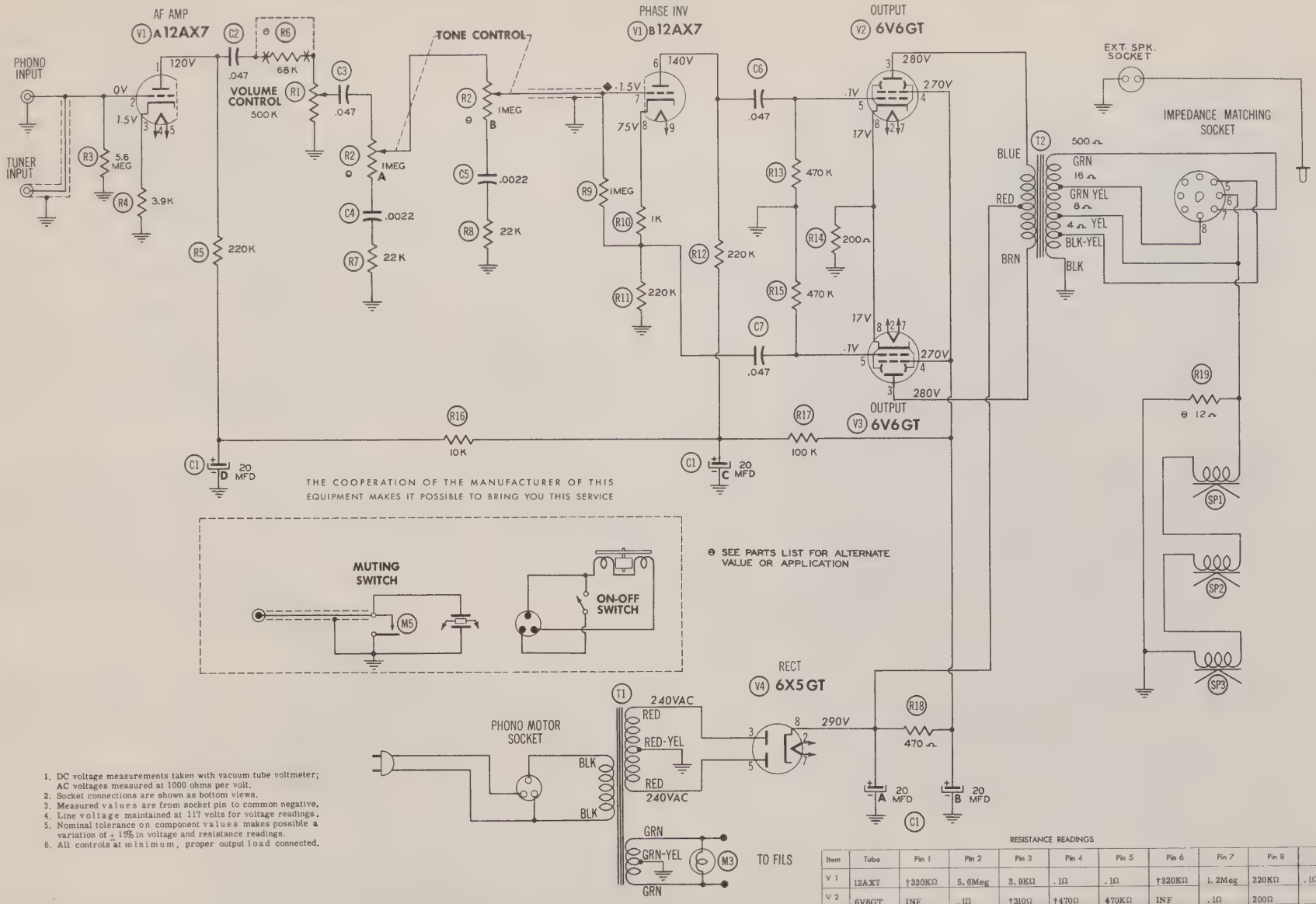
ITEM No.	REPLACEMENT DATA V-M PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2		†S-66 or ♦†S-66SD	†AC-434 or ♦†AC-434D1 or ♦†AC-434D2 or ♦AC-434D	†W-75TPS or †♦W-75DS or ♦W-75TPD	†Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	V-M PART No.	NOTES
M3	Pilot Light	4654	#47, Bayonet
M4	Switch	467	On-Off
M5	Switch	4811	Muting assembly
M6	Motor	7340	Phono
	Cabinet	6996	Blond
	Knob	4433-G	Reject
	Knob	4476	Speed Control
	Knob	6779	Control
	45 Spindle	6100	
	Lucite Rod	6784	Lazy Light

CHASSIS—BOTTOM VIEW




AF AMP
V1 A 12AX7
PHASE INV
V1 B 12AX7
OUTPUT
V2 6V6GT
OUTPUT
V3 6V6GT
RECT
V4 6X5GT
PHONO INPUT
TUNER INPUT
VOLUME CONTROL
500K
TONE CONTROL
PHONO MOTOR SOCKET
EXT. SPK. SOCKET
IMPEDANCE MATCHING SOCKET
MUTING SWITCH
ON-OFF SWITCH
TO FILS
THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†330KΩ	5.6Meg	3.9KΩ	.1Ω	.1Ω	†320KΩ	1.2Meg	220KΩ	.1Ω
V 2	6V6GT	INF	.1Ω	†310Ω	†470Ω	470KΩ	INF	.1Ω	200Ω	
V 3	6V6GT	INF	.1Ω	†230Ω	†470Ω	470KΩ	INF	.1Ω	200Ω	
V 4	6X5GT	INF	.1Ω	130Ω	INF	115Ω	INF	.1Ω	160KΩ	

† MEASURED FROM PIN 8 OF V4
♦ MEASURED FROM PIN 8 OF V1

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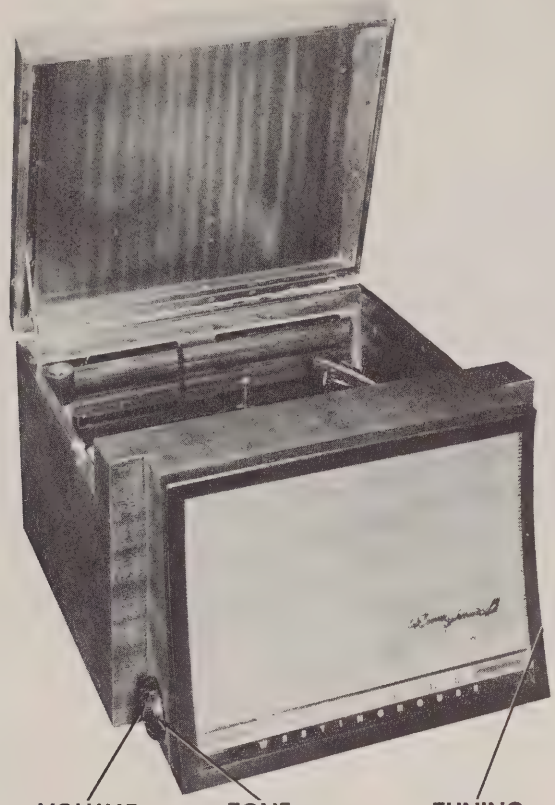
269-15

WESTINGHOUSE MODELS H-457T6, H-458T6, H-459T6, H-460T6, H-465R6, H-466R6, H-467R6, H-468R6 (Ch. V-2229-1, -2, -3)

WESTINGHOUSE MODELS H-457T6, H-458T6, H-459T6, H-460T6, H-465R6, H-466R6, H-467R6, H-468R6 (Ch. V-2229-1, -2, -3)

WESTINGHOUSE MODELS H-457T6, H-458T6, H-459T6, H-460T6, H-465R6, H-466R6, H-467R6, H-468R6 (Ch. V-2229-1, -2, -3)

DENVER, COLORADO



TRADE NAME	Westinghouse Models H-457T6, H-458T6, H-459T6, H-460T6 (Ch. V-2229-1), H-465R6, H-466R6 (Ch. V-2229-2), H-467R6, H-468R6 (Ch. V-2229-3)
MANUFACTURER	Westinghouse Electric Corp., TV-Radio Div., Metuchen, N.J.
TYPE SET	AC Operated Radio-Phono Combination Superheterodyne Receiver (Ch. V-2229-1 has only Phono Provisions)
TUBES (Six)	Types 12BE6 Conv., 12BA6 IF Amp., 6AQ6 Det.-AVC-AF Amp., 6C4 2nd. AF Amp., 50L6GT Output, 35Z5GT Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles RATING .41 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC - 1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MMF	High side to antenna stator lug terminal. Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	"	1625KC	"	"	A5	"
3.		Loop	1400KC	Tune to 1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT V-9840 - SEE SIMILAR V-M MODEL 950 , PHOTOFACT SET #216 — FOLDER #11 OR RECORD CHANGER MANUAL CM-5.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

WESTINGHOUSE
MODEL H-457T6 (Ch. V-2229-1)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Westinghouse PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-1st. AF Amplifier	6AQ6	6AQ6	7BT	
V4	2nd. AF Amplifier	6C4	6C4	6BG	
V5	Output	50L6GT	50L6GT	7S	
V6	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Westinghouse PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	60	250	V-14435-1	AFH4-46		C023			R1637	Red
B	40	250								Green
C	20	150								Blue
C2	.05	200	RCP10W2503M	P288-05	DF-503	CUB2S5		PT415	2TM-S5	
C3	10000		V-9863-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C4	.05	400	RCP10M4503M	P488-05	DF-503	CUB4S5		PT415	4TM-S5	
C5	.05	200	RCP10W2503M	P288-05	DF-503	CUB2S5		PT415	2TM-S5	
C6	150		R4CC21YY151M	SI150	D6-151	TP36	GP2K-151	UC-5315	5GA-T15	
C7	10000		V-9863-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C8	5000			BPD-005	DD-502	K080	811-005	DC-525	5HK-D5	Note 1
C9	10000		V-9863-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C10	10000		V-9863-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C11	1000		R2CC61Z5Z102P	BPD-001	DD-102	K069	801-001	DC-521	5HK-D1	
C12	.1	200	RCP10W2104M	P288-1	DF-104	CUB2P1		PT401	4TM-P1	
C13	.047	400	V-10157-4473M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	
C14	.05	400	RCP10M4503M	P488-047	DF-503	CUB4S47		PT4147	4TM-S47	

Note 1. Some versions use 10000MMF in this application (part no. V-9863-3).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	V-12954-2	*QJ-617R		F1-52	UF16A	Tone - Panel
B	500KΩ	½				R2-47	UR55T-54	Volume - tapped @ 40KΩ-rear
C	Switch					KB-1	US-26	Attach to R1B

* CONCENTRIKIT EQUIVALENT : KIT K-5, BASE ELEMENTS & SHAFTS : B13-137 & P1-020 (Panel)
B18-133X & R1-100 (Rear)
76-1 SWITCH

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Westinghouse PART No.	IRC PART No.	
R2	22KΩ	½	RC20AE223M	BTS-22K	
R3	68Ω	½	RC20AE680M	BTS-68	
R4	10KΩ	1	RC30AE103M	BTA-10K	
R5	47KΩ	½	RC20AE473M	BTS-47K	
R6	3.3Meg	½	RC20AE335M	BTS-3.3Meg	
R7	4.7Meg	½	RC20AE475M	BTS-4.7Meg	
R8	470KΩ	½	RC20AE474M	BTS-470K	
R9	22KΩ	½	RC20AE223M	BTS-22K	
R10	470KΩ	½	RC20AE474M	BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Westinghouse PART No.	IRC PART No.	
R11	7500Ω	½	RC20AE752M	BTS-7500	
R12	270KΩ	½	RC20AE274M	BTS-270K	
R13	22KΩ	½	RC20AE223M	BTS-22K	
R14	470KΩ	½	RC20AE474M	BTS-470K	
R15	180Ω	1	RC30AE181K	BTA-180	Note 1
R16A	500Ω	5	V-14574-1		
B	5500Ω	3			
R17	15Ω	1	V-6067-14	BTA-15	Note 2
R18	10Ω	½	RC20AE100K		Note 2

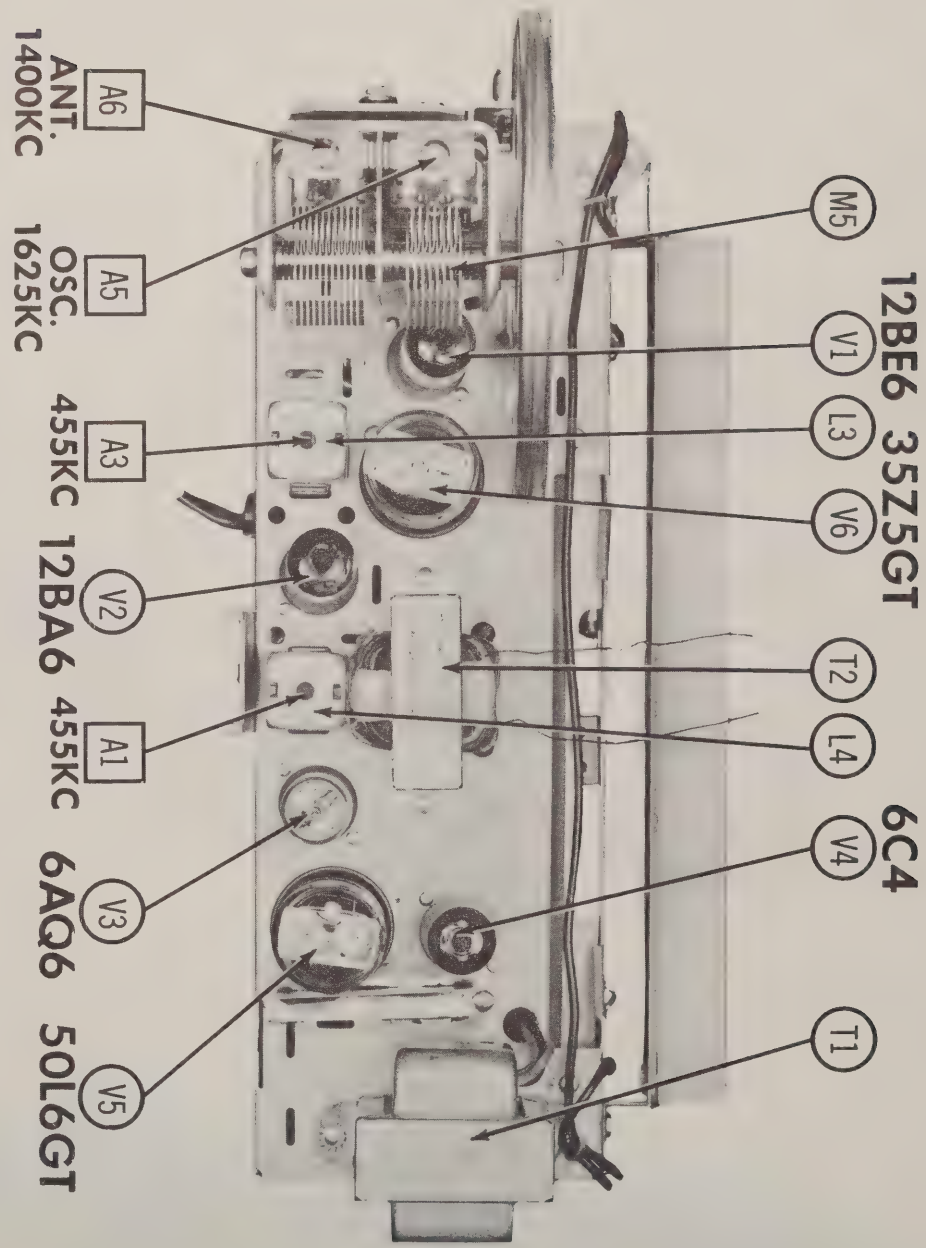
Note 1. Later production chassis use 220Ω in this application.
Note 2. Used in later versions only.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Westinghouse PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.
T1	117VAC @ .18A tap @ 12VAC @ .12A	220VAC* .072A			V-14446C-1					

* Autoformer.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.1	REPLACEMENT DATA Westinghouse PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	NOTES
T2	2.2KΩ	3.2Ω SEC.2 21.7Ω RES.	V-14447C-1						

SPEAKER

ITEM No.	RATINGS SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA Westinghouse PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	8"	PM	3.2Ω	V-14438-1	ST-115 Mod. P8-V	8A21	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Westinghouse PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Loop Ant.	2.9Ω		V-14519-1				Includes cabinet back
L2	Osc. Coil	1Ω	11.5Ω	V-14408-2	14-1073 *		69-OSC■	
L3	Input IF	16Ω	16Ω	V-10945-1	16-6758	BC-352	12-C1	
L4	Output IF	15Ω	14Ω	V-10350-1	16-6754	BC-355	12-C6	

* Leads sufficient mounting support.
■ Drill mounting hole.

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA Westinghouse PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	SHURE PART No. CARTRIDGE	SHURE PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M1		ACD-J	A-1 A-3	W22AB	A65MG A62A	46T	0-1 or S-1 & 0-3	

ASTATIC, SHURE AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

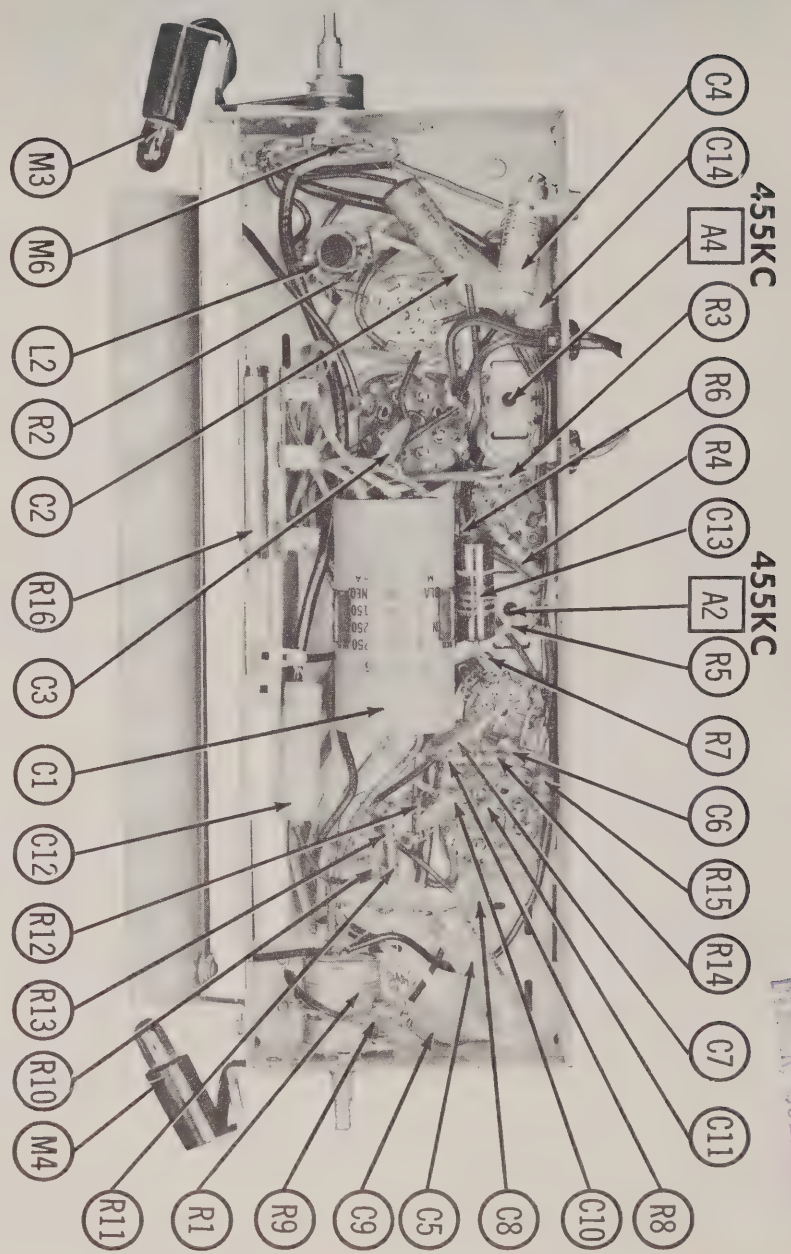
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA Westinghouse PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	REMARKS
M2		*JP-30 or †JPS-30 or ♦JPS-30D & *JP-30LP or †JPS-30LP or ♦JPS-30LPD	*C-320 or †C-318 or ♦C-318D & *A-322 or †A-300 or ♦A-300D	*W-30A or †W-30S or ♦W-30D & *W-30MGA or †W-30MGS or ♦W-30MGD	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

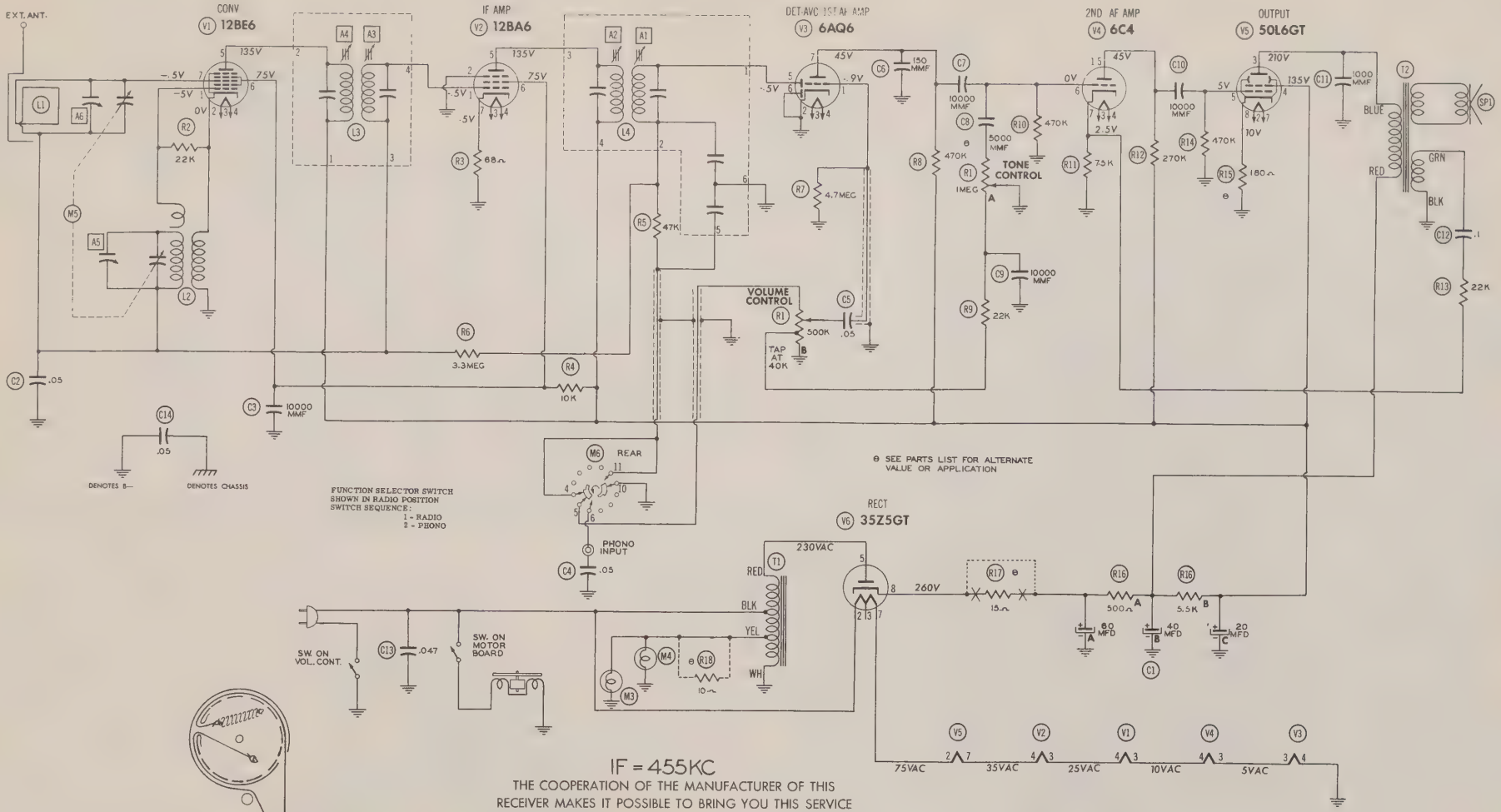
ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M3	Dial Light		#47, Bayonet
M4	Dial Light		#47, Bayonet
M5	Tuning Cap.	V-14436-1	19-378MMF, 14-105MMF
M6A	Switch	V-14439-1	Radio-Phono - All models except H-467R6, H-468R6
B	Switch	V-14439-2	Radio-Phono - Models H-467R6, H-468R6
	Cabinet	V-1365-1	Model H-465R6
	Cabinet	V-1365-2	Model H-466R6
	Cabinet	V-1369-1	Model H-467R6
	Cabinet	V-1369-2	Model H-468R6
	Cabinet	V-1366-1	Model H-457T6
	Cabinet	V-1366-2	Model H-458T6
	Cabinet	V-1366-3	Model H-459T6
	Cabinet	V-1366-4	Model H-460T6

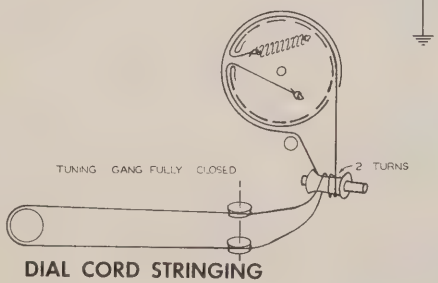
CHASSIS—BOTTOM VIEW



WESTINGHOUSE
MODEL H-457T6 (Ch. V-2229-1)

WESTINGHOUSE
MODEL H-457T6 (Ch. V-2229-1)





DIAL CORD STRINGING

IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12BE6	22KΩ	1Ω	12Ω	24Ω	†6KΩ	†16KΩ	3.8Meg	
V 2	12BA6	3.8Meg	0Ω	24Ω	36Ω	†6KΩ	†16KΩ	68Ω	
V 3	6AQ6	4.7Meg	0Ω	8Ω	0Ω	547KΩ	0Ω	†475KΩ	
V 4	6C4	†275KΩ	30KΩ	6Ω	12Ω	†275KΩ	470KΩ	7.5KΩ	
V 5	50L6GT	INF	75Ω	†800Ω	†6KΩ	470KΩ	0Ω	24Ω	180Ω
V 6	35Z5GT	0Ω	117Ω	110Ω	0Ω	90Ω	0Ω	75Ω	60KΩ

ALL READINGS TAKEN IN "RADIO" POSITION
† MEASURED FROM PIN 8 OF V8

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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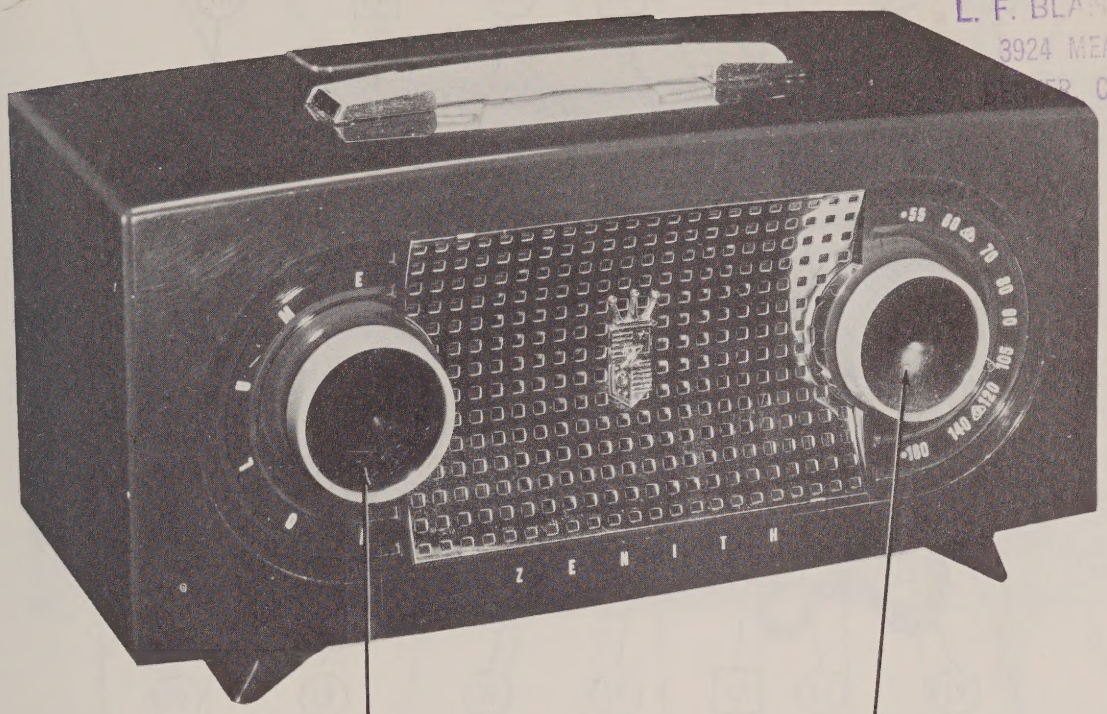

ZENITH MODELS
R511F, R, V, W (Ch. 5R01)

TRADE NAME	Zenith Models R511F, R, V, W (Ch. 5R01)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AT6 Det-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC
RATING	.24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.5MFD	High side to pin 7 (grid) of 12BE6 (V1). Low side to B-.	455KC (400~ Mod)	600KC	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2	Direct	Loop	1600KC	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3	"	"	1400KC	Tune to 1400KC signal.	"	A6	"

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PARTS LIST AND DESCRIPTIONS

ZENITH
MODEL R511F (Ch. 5R01)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det-AVC-AF Amp.	12AT6	12AT6	7BT	
V4	Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	60	150	22-2537	PRS150/40-20-20		BBRT44215		TCT-3113	TVA-3444	
B	20	150								
C2	.05	200	22-829	P288-05	DF-503	PJ2S5		PT415	2TM-S5	
C3	110		22-5							
C4	10000		22-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C5	.02	200	22-327	P288-02	DF-203	CUB2S2		PT412	2TM-S2	
C6	10000		22-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C7	10000		22-3	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C8	470		22-6	BPD-00047	DD-470	G060	811-00047	UC-5347	5GA-T47	
C9	.02	400	22-327	P488-02	DF-203	CUB4S2		PT412	4TM-S2	
C10	10000		22-1379	BPD-01	DD-103	K082	811-01	DC-511	5HK-S1	
C11	.05	200	22-829	P288-05	DF-503	CUB2S5		PT415	2TM-S5	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	63-2972	Q11-137	A47-1Meg-S	AB-69	U-53	Volume
B	Shaft		Not Req.	KSS-3	AK-4	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A
D	Cover		Not Req.	Not Req.	Not Req.	KB-5	Not Req.	Attach to R1C

RESISTORS

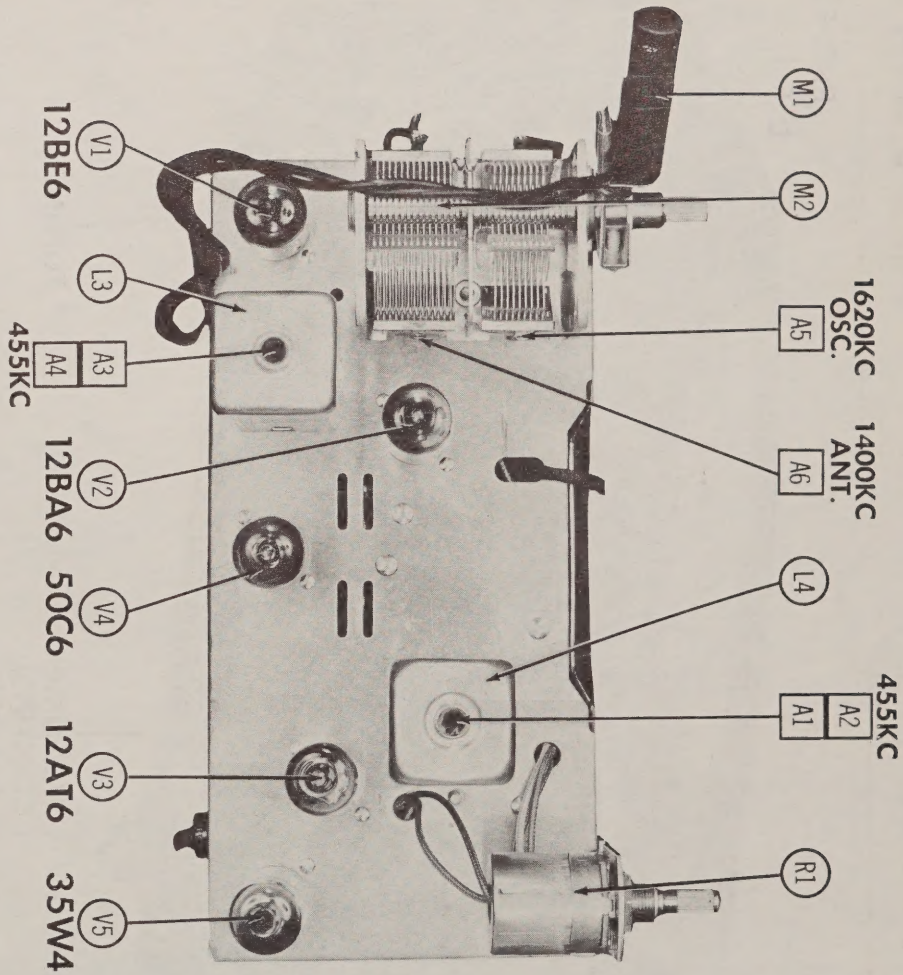
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R2	22KΩ	½	63-1842	BTS-22K	
R3	1Meg	½	63-1912	BTS-1Meg	
R4	68Ω	½	63-1737	BTS-68	
R5	2.2Meg	½	63-1926	BTS-2.2Meg	
R6	1800Ω	½	63-1796	BTS-1800	
R7	10KΩ	½	63-1828	BTS-10K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R8	4.7Meg	½	63-1940	BTS-4.7Meg	
R9	470KΩ	½	63-1898	BTS-470K	
R10	470KΩ	½	63-1898	BTS-470K	
R11	150Ω	½	63-1750	BTS-150	
R12	1000Ω	1	63-1574	BTA-1000	
R13	22Ω	1	63-3197		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.3KΩ	3.3Ω	95-1380	A-3332	A-3025	S-12X	Z1101	26S58	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.3Ω	49-761	ST-113 Mod. P4-X	4A1	

COILS (RF-IF)

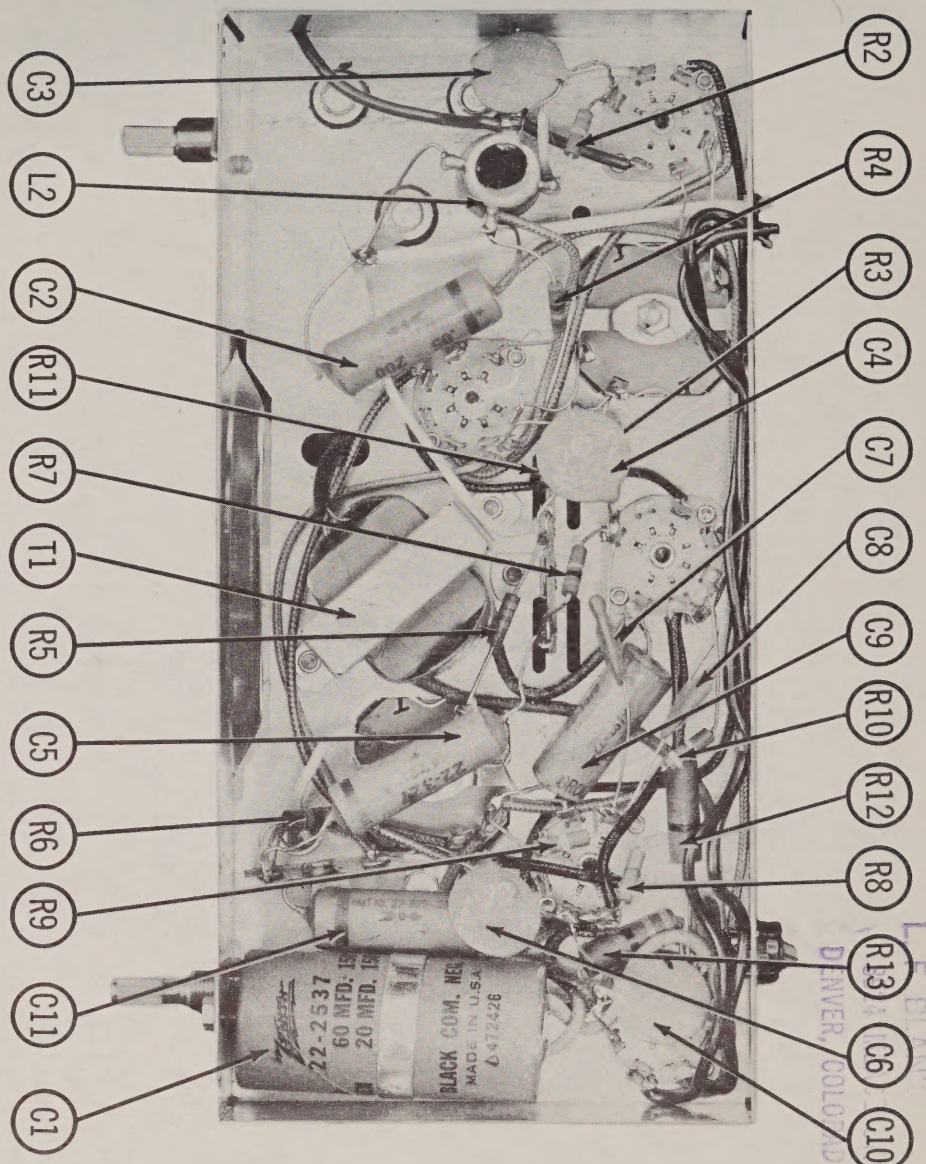
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.2Ω		S-21362				Includes cabinet back.
L2	Osc. Coil	.6Ω	5.5Ω	S-14842	14-1074*		70-Osc.*	
L3	Input IF	16Ω	16Ω	95-1101	16-6666	BC-368	012-C1	
L4	Output IF	16Ω	16Ω	95-1102	16-6770■	BC-355■	12-C6■	

* Leads sufficient mounting support.
■ Use adaptor plate and cut out center spade bolt mounting support.

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M1	Dial Light	100-67	#47, Bayonet
M2	Tuning Cap.	22-2568	2 Gang (26-455MMF; 32-180MMF.)
	Cabinet	14-1667	Model R511F
	Cabinet	14-1668	Model R511W
	Cabinet	14-1669	Model R511R
	Cabinet	14-1670	Model R511V
	Handle	36-95	Model R511W
	Handle	36-96	Models R511R, R511F
	Handle	36-97	Model R511V
	Knob	46-1291	On-Off-Volume & Tuning - Model R511W
	Knob	46-1292	On-Off-Volume & Tuning - Models R511R, R511F
	Knob	46-1293	On-Off-Volume & Tuning - Model R511V
	Dial Pointer	59-303	

CHASSIS—BOTTOM VIEW



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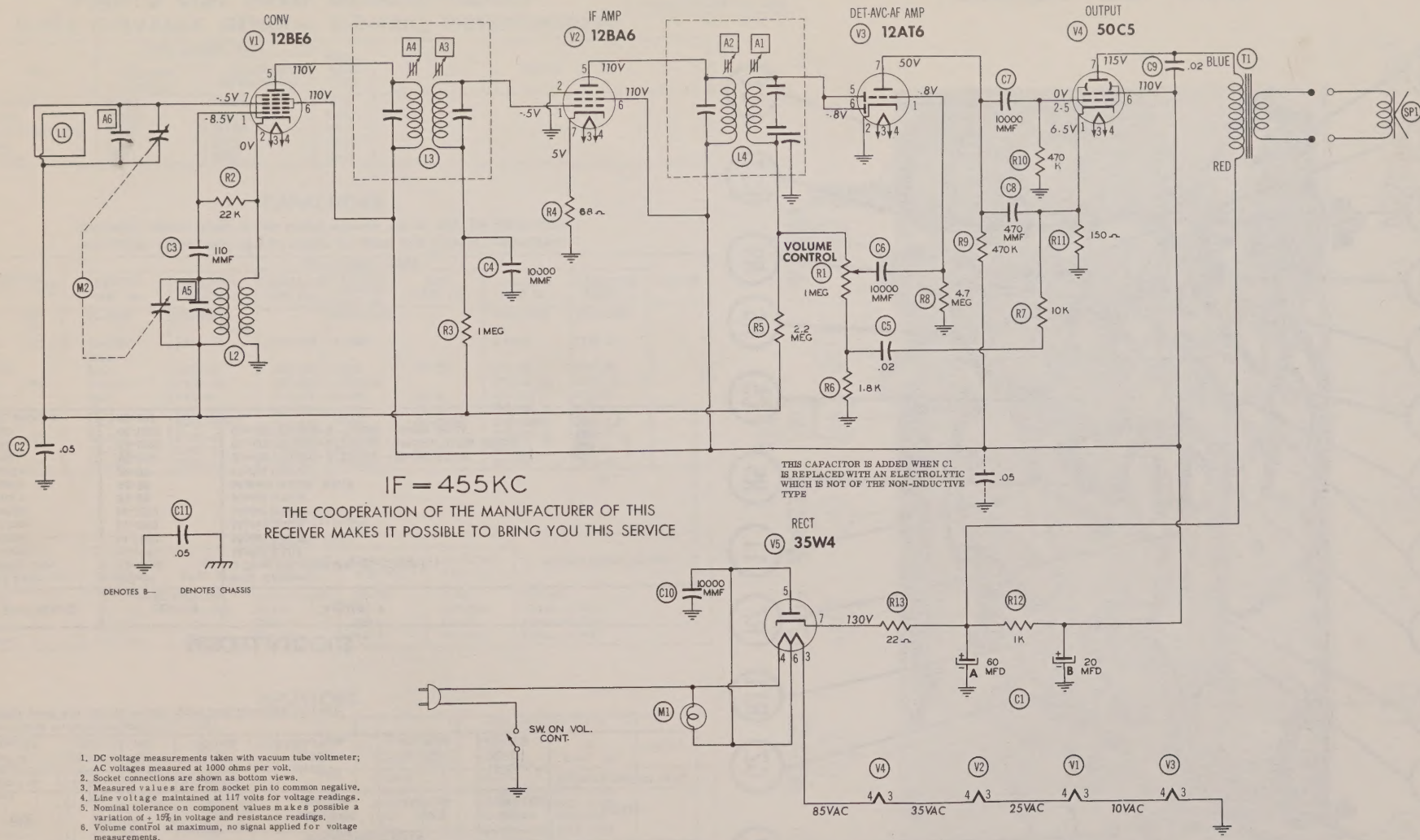
ZENITH
MODEL R511F (Ch. 5R01)



THIS CAPACITOR IS ADDED WHEN C1 IS REPLACED WITH AN ELECTROLYTIC WHICH IS NOT OF THE NON-INDUCTIVE TYPE

DENOTES B— DENOTES CHASSIS

IF = 455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	. 6Ω	12Ω	24Ω	†1KΩ	†1KΩ	3. 2Meg
V 2	12BA6	4. 2Meg	0Ω	24Ω	36Ω	†1KΩ	†1KΩ	68Ω
V 3	12AT6	4. 7Meg	0Ω	0Ω	12Ω	1Meg	1Meg	†470KΩ
V 4	50C5	150Ω	470KΩ	36Ω	85Ω	470KΩ	†1KΩ	†180Ω
V 5	35W4	†22Ω	0Ω	85Ω	117Ω	110Ω	110Ω	110KΩ

† MEASURED FROM PIN 7 OF V5.

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